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COMPILED FROM WORLD LITERATURE ON PLANT PATHOLOGY AND APPLIED MYCOLOGY

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ERRATA

VOLUME 40

page	32	line 2	for ' R ' read ' A '
	35	1	for ' HASSENBRAUK ' read ' HASSEBRAUK '
	42	7	for ' heated ' read ' drained '
	50	1	for ' LAVITS'KA (Mme Z. G.)' read ' LAVYTS'KA (Mme Z. H.)'
	56	23	for '(D. V.)' read '(D. Y.)'
	81	9	for ' Y ' read ' YU '
	88	5	for ' *Penstemon* ' read ' *Pentstemon* '
	100	1	for ' ZEMANEK (I.)' read ' ZEMÁNEK (J.)'
	121	46	for ' KOLEF ' read ' KOLEK '
	165	41	for '(C. G.)' read '(C. C.)'
	166	42	for '(K. Y.)' read '(K. YU)'
	240	13	for '(W. J.)' read '(W. A.)'
	242	35	for ' NORTVEDT ' read ' MORTVEDT '
	244	38	for ' *applanatum* ' read ' *pseudoferreum* '
		40	delete ' in the bole '.
		49	for ' jungle ' read ' rubber '
	254	27	for ' *P. picea* [*Picea abies*]' read ' *P. pinea* '
	315	19	for ' U.S.A.' read ' N. America '
	358	24	for ' N.H.' read ' N.J.'
	405	50	for ' *sativus* ' read ' *miyabeanus* '
	408	26	for '(P. M.)' read '(P. N.)'
	428	34	for ' Brickville ' read ' Brickaville '
	458	26	for '(J. S.)' read '(J. A.)'
	465	39	for ' JOHNSON ' read ' JOHNSTON '
	466	9	for ' HASIOKA ' read ' HASHIOKA '
	512	36	for ' K.I.' read ' K.G.'
	517	5	for ' Univ.' read ' St. Univ.'
	521	28	for ' Univ.' read ' St. Univ.'
	523	4	for ' CARLISLE ' read ' CARLILE '
		29	for ' D.B.' read ' B.D.'
	531	15	for ' *andropogonis* ' read ' *andropogoni* '
	541	2	for ' *T. itoensis* ' read ' *T. itoana* '
	560	16	for ' RAPPORT ' read ' RAPPAPORT '
	586	15	for ' K.I.' read ' K.G.'
	606	3	for ' MCMILLAN ' read ' MCMILLIAN '
	623	24	for ' LETOURNEAU ' read ' LE TOURNEAU '
	658	44	for '[Map 58]' read '[Map 192]'
	688	27	for '(R. J.)' read '(T. J.)'
	730	26	for ' *P. tabacum* ' read ' *P. tabaci* '

COMMONWEALTH MYCOLOGICAL INSTITUTE

Review of Applied Mycology

VOLUME 40 · PART 1 · JANUARY 1961

Literature references in [ ] refer to the *Review of Applied Mycology*.
Map references are to the *C.M.I. Distribution Maps of Plant Diseases*.

CREELMAN (D. W.). **Thirty-eighth Annual Report of the Canadian Plant Disease Survey, 1958. Thirty-ninth Report, 1959.**—xxii+123 pp.; xxv+93 pp., 1960.

In the sect. of the 1958 report [cf. **37**, 515] on new and noteworthy diseases (pp. v–vi) it is stated that race 6A of oat stem rust (*Puccinia graminis*) at Appleton, Ont. [**39**, 535], damaged the usually resistant vars. Garry and Rodney as much as the susceptible Bond. Race 7A, also pathogenic to Rodney, occurred frequently in Man. Newly recorded on wheat were *Cephalosporium gramineum* [**38**, 591] in Ont. and N.B. and *Agropyron* streak mosaic virus [**39**, 535] in Ont.

In southern Alta, lucerne yields were reduced by 15% by bacterial wilt (*Corynebacterium insidiosum*) [**38**, 385]. A potato disorder, called 'little leaf', which also reduces the size of the tubers, these again producing affected plants, increased in Prince Edward Island, mostly on Sebago.

New records included *Cylindrocarpon radicicola* rotting stored carrots and *Cladosporium cucumerinum* and *Colletotrichum atramentarium* on squash, all in Nova Scotia.

Anjou pit, of unknown etiology, was more severe on d'Anjou pears in B.C. than in any previous season.

In the corresponding sect. of the 1959 report (pp. iv–v, in French pp. vi–viii) it is noted that once again *P. recondita* on wheat [**39**, 565] was the most prevalent cereal rust in W. Canada, causing losses of 1,000,000 bush. in areas of Man. planted with Thatcher. *Dilophospora alopecuri* was reported on oats in Que. Sunflower leaf spot (*Septoria helianthi*) was found for the 1st time since 1947.

New records for Canada were *Sclerotium cepivorum* [map 331] on onion in Man. and *Monilinia* [*Sclerotinia*] *padi* on sour cherry in Prince Edward Island. *Itersonilia perplexans* was found for the 2nd time [**37**, 206] on parsnip in N.B.

On strawberries in Nova Scotia *Septoria aciculosa* was severe and in the Niagara Peninsula, Ont., *Verticillium alboatrum* is increasing in importance. Strawberry green petal virus [**37**, 516] was reported for the first time from Ont.

Report of the Minister of Agriculture for Canada for the year ended March 31, 1960.—51 pp., 1960. 50 cents.

In the Crop Protection sect. (pp. 17–19) of this report [cf. **39**, 534] it is stated that the eggs of the leafhopper vector [*Macrosteles fascifrons*] of aster yellows virus [**37**, 516] are able to overwinter on autumn-sown cereals, but large numbers of adults are carried in the spring by air currents from the central U.S.A. In tests on vegetable crops good protection was afforded by twice-weekly applications of 2 insecticides.

Report of the Rothamsted Experimental Station for 1959.—288 pp., 1 pl., 1 map, 1960.

In the report [cf. **38**, 649] from the Plant Pathology Dept (pp. 94–110) F. C. BAWDEN & A. KLECZKOWSKI [cf. **39**, 499] note that whereas UV-inactivated TMV cannot

be photo-reactivated, half the damage from irradiation of infective TMV nucleic acid can be reversed by exposure to visible light. Therefore, attempts were made, by exposing leaves to visible light at various times after inoculation with intact virus, to obtain evidence that on infection TMV initially separates into protein and nucleic acid: subsequent photo-reactivation should indicate separation of the nucleic acid. This proved impossible owing to the extreme variability of the effect of UV light on virus multiplication in the leaves [? tobacco], masking any photo-reactivation of the inoculum. The extent of the effect of irradiation on the host threw doubt on the conclusions of workers who have used radiation to measure the time when virus starts to multiply.

R. C. Sinha concludes that 'red clover mottle' virus, originally isolated from red clover growing at Rothamsted, is distinct from previously described viruses of legumes. It was transmitted by sap-inoculation to many leguminous spp., but *Gomphrena globosa* was the only non-legume infected. The virus was not transmitted by 6 aphid spp. or by seed. Its thermal inactivation point is 63° C., and it has spherical particles about 28 mμ diam. Similar numbers of local lesions developed in inoculated leaves of French bean [*Phaseolus vulgaris*] between 12 and 24°, but fewer developed at 28°, and none at 32°. The rate at which the virus accumulated in leaves increased up to 28°, but then decreased to zero at 32–34°.

Observations by G. D. Heathcote & M. J. Way on the spread of virus diseases (at first chiefly [pea] leaf roll virus [cf. **38**, 554]) in field [broad] beans grown to compare different seed rates showed that the number of plants infected/unit area decreased greatly as seed rate increased. Infection on 10 July ranged from 7·7% leaf roll and 6·5% [unspecified] mosaic in plots sprayed with insecticide having only 50 lb. seed/acre to 0·3% leaf roll and 0·1% mosaic in plots with 600 lb./acre.

A. J. Gibbs found lucerne mosaic virus to occur in lucerne crops in all parts of Great Britain [**36**, 812]; an av. of 25% of the plants was affected in crops sown before 1955. Plots with 75% infected plants yielded 10% less fresh wt. than comparable plots with 18% infection; yield decrease was greatest (20%) at the spring cut, when symptoms were also most noticeable.

Marion A. Watson found no vector but *Cavariella aegopodiae* for carrot motley dwarf virus [cf. **38**, 651]. The virus persists in the vector for at least 1 week, can be acquired in 7-hr. feeding, and transmitted during ½ hr., but a period of at least 14 hr. (opt. 48 hr.) is required between the start of the infection feed and the end of the test feed. The virus could not be transmitted mechanically from carrot to carrot but *Datura tatula* and *Nicotiana clevelandii* were infected by aphids, sap inoculation from these causing local lesions on *Gomphrena globosa*. Infective aphids also caused local lesions on tobacco.

Transmission experiments by Marion A. Watson & T. Mulligan with barley yellow dwarf virus suggest that there are many yellow dwarf viruses transmissible by different combinations of vector spp. and that they may change from one to another when the predominant aphid sp. changes [cf. **39**, 567].

Cocksfoot streak virus [**32**, 630] was transmitted to several vars. of cocksfoot [*Dactylis glomerata*] and to Italian rye grass [*Lolium multiflorum*] by sap inoculation. *Myzus persicae* transmitted best after fasting for some hours and feeding for only 2 min. The virus persisted for less than 1 hr. in the vectors when they were feeding on immune hosts. *Hyalopterus humulis*, which appears to have only cocksfoot as host, is a vector; *Sitobium avenae* and *Metapolophium dirhodum* also transmitted in short feeding periods, but *Rhopalosiphum padi* and *S. fragiae* did not.

Mary D. Glynne & Judith Cox describe experiments on wheat eyespot (*Cercosporella herpotrichoides*) and take-all (*Ophiobolus graminis*) [**39**, 19]. *Gibellina cerealis* [cf. **35**, 872] was exceptionally prevalent in these plots. Judith Cox, estimating the survival of *C. herpotrichoides* [cf. **38**, 652], found that where wheat was grown in 1958 spore-producing straws averaged 1·4/sq. yd. and that 5·8% of

the plants in the 1959 crop were infected in May as opposed to 0·2 and 0 in a section left fallow in 1958.

Further experiments by D. H. Lapwood into the nature of haulm resistance to potato blight [*Phytophthora infestans*] involved study of the pattern of leaf destruction on a number of vars. [cf. **39**, 491]. Infection sometimes advanced through the petiole to other leaflets, but in Ackersegen was checked in the lamina. Lesions girdled the stem more in some vars. than others. A 50% level of blight destruction was reached 2–14 days later than in King Edward, according to the var., and leaflet damage varied from 33–85%. Lower leaf surfaces were usually more susceptible than upper; the rate of leaf destruction varied with the site of initial infection and the var.; sporulation also varied with var.

J. M. Hirst & O. J. Stedman state that spore traps operated in aircraft collected max. concs. of *Puccinia graminis* spores at 3,000–5,000 ft. [cf. **38**, 652]. The close correlation between the catches and air trajectories from S. Europe suggested that before mid-July uredospores caught in Britain come from abroad.

In a search for better differential hosts for the 3 races of *Plasmodiophora brassicae* [**35**, 568] and a study of different types of response to infection [**39**, 641], as affected by host spp. or vars., I. MacFarlane ascertained that some swede vars., when infected by race 1, developed fairly numerous, very minute galls on fine rootlets. I. MacFarlane & J. Gourlet, in tests of complexes of Cu, Zn, and Co with gluconic acid, found that increasing doses of the Cu compound decreased the dry wt. of clubs, but increased the wt. of fibrous roots, tops, and total dry wt. of both cabbage and *Brassica juncea*. The Zn compound apparently hydrolysed in water and Zn was probably present in the soil as hydroxide; this completely suppressed club root, the yields of tops being nearest to those of the uninoculated controls. The Co compound was about as effective as Cu or Zn in preventing club root, but was more toxic.

In seed treatment tests by E. W. Buxton to control losses of pea seedlings from *Fusarium* wilt (*F. oxysporum* f. *pisi*) [**39**, 520] seed of Onward and Dark Skin Perfection was used. Thiram increased emergence by 30%, captan by 46%, and CoBH (quinone-oxime-benzoylhydrazone) by 24%, and subsequent yield was 89% greater in the resistant Dark Skin Perfection than in untreated. No treatment affected incidence in Onward.

Of 137 morphologically different isolates of the fungi most commonly found growing on pea roots 14% inhibited pathogenic *F. oxysporum* strongly, 42% to a considerable degree, 29% slightly, and 15% not at all. *Gliocladium roseum*, certain bacteria, and other strs. of *F. oxysporum* were among the strongest inhibitors; they were even more inhibitory when grown in media containing rhizosphere extract, pea root exudate, or both. The evidence indicated that competition between pathogenic *F.* and other rhizosphere flora for nutrients in root exudates may be at least as important as overcoming antibiosis in maintaining successful growth of the pathogen; also, that rhizosphere soil extract and microbial metabolites together inhibit the growth of *F. o.* f. *pisi* near pea roots and that the growth-promoting effects of root exudate from the susceptible Onward are to some extent offset by its ability to increase inhibition by other rhizosphere inhabitants. In rhizospheres of Onward the populations of *F.* increased from 10,000/g. dry soil on 2-week-old plants to 195,000/g. on 5-week-old plants, the figure falling to 150,000/g. after 7 weeks; in Alaska, resistant to race (i), the corresponding figures were 6,000, 263,000, and 142,000. Of the total rhizosphere flora isolated each week, *F. oxysporum* formed 8, 35, 54, 61, 60, 55, 32, and 61% on Onward, and 12, 19, 41, 71, 59, 60, 35, and 69% on Alaska. Wilt developed most rapidly in soils in which Onward had been grown for 2 or 6 weeks. Inoculation tests with rhizosphere isolates showed that only a small proportion were pathogenic, indicating that the rhizosphere effect is exerted equally on pathogenic and saprophytic spp. of *F.* In soils in which pea cropping

had been repeated once to 6 times the populations of *F. oxysporum* took 8 weeks to fall from 123,000 to 25,000/g. of dry soil, whether the cropping was with Onward or Alaska.

Roots of Sitka spruce (*Picea sitchensis*) examined on 15 occasions in the growing season showed 3 distinct diseases: a pre-emergence and immediately post-emergence damping-off; a subsequent mid-summer sudden browning of the plants; and a stunting without discoloration. Emergence in plots treated with formalin was 44%, with chloropicrin 33%, and in the untreated 16%. Percentages of browned plants counted on 3 occasions were 6·4 on formalin-treated, 10·5 on chloropicrin-treated, and 24·7 on the untreated plots. Autumn stunting was confined to the formalin-treated plots. The prevalence of the 18 different micro-organisms found on roots and in soil away from roots during the growing season fluctuated greatly. Striking changes occurred in *Pythium*, which was abundantly present at first, but almost absent later, in *F. oxysporum*, rare then abundant, and in *Trichoderma viride*, which rose to a peak in late Aug. The evidence strongly suggested that *Pythium* caused most of the damping-off, and that the browning was chiefly due to *F. oxysporum*. Several isolates of *F. oxysporum* and *F. roseum* from later samples caused stunting of seedlings inoculated in the glasshouse.

E. W. Buxton & A. C. Hastie describe studies on variation in *Verticillium alboatrum* from hops [cf. **39**, 651] in which progeny work was started to ascertain whether genetic recombination occurs without sex. It was found necessary to synthesize heterokaryons composed of strs. labelled with known nuclear markers and to determine whether heterokaryosis would recombine colour with these markers. Nutritionally deficient mutants were isolated after UV radiation and conidia were obtained which required either adenine or both methionine and biotin, but a sample of about 1,000 spores contained none able to grow on unaugmented media. The results confirmed the occurrence of heterokaryosis and suggest that a system resembling parasexuality allows genetic recombination in *V. alboatrum*.

P. H. Gregory & Maureen E. Bunce, studying the mycofloral succession in hay [cf. **38**, 652], state that good samples yielded only 400,000 air-borne spores/g., though poorer ones had up to 20 million *Aspergillus glaucus* spores. Hays associated with human and animal diseases had up to 85 million fungus spores or 1,500 million bacteria and actinomycete spores/g. The fungi present in these inferior hays are mostly thermophilic.

In the report from the Insecticides and Fungicides Dept F. T. Last (pp. 130–131) states that most conidia of an isolate of *Botrytis* sp. under study retained the ability to germinate until the cultures were 50 days old, but lost the ability to infect broad beans in 20 days when suspended in water. The infectivity of conidia from cultures 20–50 days old was partially restored by adding sucrose, mannose, maltose, and honey-dew of *Aphis fabae* to the infection drop, but not by adding amino-acids and vitamins. Lesions were formed by water suspensions of the old conidia when inoculated to abraded leaves. A. H. McIntosh, studying the effect of duration of exposure and temp. on the toxicity of water-soluble fungicides to spores of some strs. of *B. fabae*, kept spores in solutions of poisons at 10° and 25° for about 10 days. The difference in the behaviour of different strs. was one of degree only. With most the effect of temp. on toxicity was slight. With 1 typical str. the ED_{50} increased with the passage of time at each temp. and finally reached a steady value at the 'end-point'. ED_{50} at 10° was usually > at 25° and its increase was always more at 10° than 25°.

Keyworth (W. G.). **Plant pathology report.**—*Rep. nat. Veg. Res. Sta., Warwick*, **10** (*1959*), pp. 40–43, 1960.

In this report for Oct. 1958–Sept. 1959 [cf. **38**, 562] W. G. Keyworth & J. Sheila Howell record that spread of silvering disease of red beet [*Corynebacterium betae*:

37, 511] during the wet autumn and winter was considerable, reaching up to 50 yd. from the nearest source of infection. Disease incidence was 20% where seed had been treated with Hg dusts, but only 1–4% with streptomycin. J. A. Tomlinson & Bridget R. Smith report that in further commercial trials Zn frit, applied to entire watercress beds at 1 lb. sq. yd., controlled crook root [*Spongospora subterranea* f.sp. *nasturtii*: **38**, 286] but caused yellowing of the plants in some beds. Mosaic disease of watercress [**37**, 1] has been much reduced on many farms by raising the crop from seed.

R. B. Maude found the F_1 progeny of *Lycopersicon hirsutum* × tomato var. Harbinger to be resistant to stem and soil infection by *Didymella* [*lycopersici*: cf. **39**, 260] when inoculated in the field. In 1959 testing of more F_1 seedlings and the 1st backcrosses to tomato indicated that segregation for resistance had occurred in the backcross.

A. G. Channon found that captan and pentachloronitrobenzene, both at 0·8%, applied as a single drench along the rows at $\frac{1}{4}$ pint sq. yd. in July, caused marked reductions of parsnip canker [*Itersonilia* or *Phoma* spp.: **38**, 562]. To study the effects of aldrin on club root [*Plasmodiophora brassicae*: **39**, 642] on Primo cabbage the conc. used was 0·04–0·32%, with a sticker added in some treatments. Comparisons were made with a standard post-planting 'spot' treatment of $\frac{1}{2}$ pint 0·04% aldrin emulsion plant and with a combined calomel (10%)+aldrin (0·19%) dip. All treatments gave reduction of clubroot 7 weeks after planting, the most effective being the calomel-aldrin dip, followed by the dips –the sticker, but by harvest (9–10$\frac{1}{2}$ weeks) club root on all treated plots had increased considerably. Some aldrin –sticker treatments gave 65% increased wt. of tops, but for calomel-aldrin it was only 38·5%, perhaps because of an initial inhibitory effect on growth. Certain test selections bred for resistance at Univ. Wis. are showing considerable promise, though they are slow to mature.

R. B. Maude observed no loss in germination, but a reduction of infection (from 90 to 22%), in Kelvedon Wonder pea seed infected by *Mycosphaerella pinodes* when kept at 70° C. for 3 hr. in carbon tetrachloride. Soaking seeds in a 1% (active) aqueous suspension of captan gave an av. disease reduction from 85 to 5%; the fungicide penetrated deep into the seeds. Seeds treated in liquid steeps could be redried in an air stream at 21° without loss of viability. Seed treatment with a 50% thiram dust –a sticker also reduced the percentage of infected seed.

J. A. Tomlinson & Bridget R. Smith found that the *Olpidium* sp. in the roots of lettuce plants with big vein was morphologically similar to *O. brassicae*, but different in its pathogenicity [cf. **37**, 621; **39**, 762]. Thus, whereas cabbage plants became heavily infected in soil known to be heavily infested with *O. brassicae*, lettuce did not; the reverse occurred in soil infested with big vein. When the roots of lettuce plants with big vein symptoms were suspended for 5–10 min. in river or tap water, large numbers of *O.* zoospores were released, and when this suspension was watered on to soil big vein symptoms appeared in lettuce in 3–4 weeks. Zoospores were not released in distilled water at pH 5·2 or in river water adjusted to pH 5·2 with CO_2, but they were readily released in untreated river water at pH 7·9. Adjustment of soil pH over 4·9–8, however, had no effect on disease development following soil inoculation.

The same workers report that when 'mosaic-tested' lettuce seed (stated to contain $< 0{\cdot}1\%$ infection) is sown away from infected lettuce the crop remains substantially mosaic-free [cf. **37**, 512], but adequate isolation is essential; rapid infection spread in from diseased plants 200 yd. away.

J. A. Tomlinson & M. J. W. Webb found that spores of *Erysiphe polygoni* placed on leaf disks (1 cm. diam.) cut from turnip plants grown in soil watered with $ZnSO_4$ germinated but failed to develop beyond the appressorial stage. The same result was obtained when disks from untreated plants were first soaked in $ZnSO_4$

solutions; resistance in the treated disks, however, was destroyed by subsequent immersion in a solution of the Na salt of ethylene diamine tetra acetic acid. Watering the soil with $ZnSO_4$ (500 p.p.m.) caused swede plants to become resistant to *E. polygoni*: chrysanthemum did not develop resistance to *Oidium chrysanthemi* nor gooseberry to *Sphaerotheca mors-uvae*, though Zn accumulated in the leaves. Ni and Cd also conferred resistance on turnip.

CARR (A. J. H.). **Plant Pathology.**—*Rep. Welsh Pl. Breed. Sta. 1959*, pp. 61–67, 1960.

This report [cf. **38**, 54] notes that the incidence of white clover phyllody virus [cf. **37**, 243; **38**, 701] is increasing. Another condition, possibly also of virus origin, and termed 'red leaf' owing to bronzing of the foliage, also occurs in the Legume Breeding Nurseries. Affected plants weigh 20–40% less than healthy and often fail to survive the winter. Symptoms appear in mid-Apr. and are more severe during drought. The leaves are small, yellowish-green, and sometimes red, and growth is slow, but the flowers are normal.

In a survey of 296 white clover crops phyllody was found in 40% and was severe in 5%. Of 23 crops in E. Anglia all were affected (14% of the plants in the most severely infected). Phyllody increases with increasing age of the stand: though no definite conclusions regarding relative susceptibility of clover vars. could be drawn, incidence was generally lower in S. 184 than in the larger leaved S. 100 and Kersey. Phyllody can be transmitted in greenhouse experiments from white to red clover, but is not serious on the latter in the field. The survey shows that clover phyllody may be sufficiently severe to reduce seed yield. Clover 'red leaf' was also present in 22 of the E. Anglian crops examined.

Cocksfoot (*Dactylis glomerata*) plants infected by streak virus [**35**, 371] tiller less, have a reduced response to fertilizers, and recover more slowly from cutting than healthy plants. In swards with 100% infection yield was 60% lower than in healthy stands. No evidence was obtained that the virus is seed transmitted.

Differences in resistance of races of *Medicago falcata* to *Verticillium* [*alboatrum*: **37**, 297] are not correlated with ploidy, but it seems that it will be possible to combine the resistance of some genotypes of *M. falcata* with the agronomic qualities of lucerne.

MCKAY (R.), LOUGHNANE (J. B.), & MCKAY (JEAN). **Plant diseases in Ireland in 1958 and 1959.** *J. Dep. Agric. Eire*, **56**, pp. 74–79, 4 pl., 1960.

It is stated, *inter alia*, in this report [cf. **38**, 654] that in 1958 cane blight (*Leptosphaeria coniothyrium*) [cf. **33**, 241] was epidemic on raspberries: in many plantations 60% of the canes were dead by the end of the year. In 1959 Malling Promise proved very susceptible.

Narcissus bulbs which had been subjected to hot-water treatment were severely affected by basal rot (*Fusarium bulbigenum*).

New records for Ireland in 1958 included *Fomes pomaceus* [cf. **35**, 688] on plum trees and *Corynebacterium betae* [cf. **40**, 4] on beet and mangold seed crops. During 1959 2 outbreaks of non-parasitic blast of oats [cf. **30**, 224] were reported. This disorder is prevalent in years with late frosts and some of the spikelets are shrivelled when the panicle emerges from the sheath.

SALZMANN (R.). **Tätigkeitsbericht der Eidg. Landwirtschaftlichen Versuchsanstalt Zürich-Oerlikon über das Jahr 1958.** [Report on the work of the Federal Agricultural Experiment Station Zürich-Oerlikon for the year 1958.]—*Annu. agric. Suisse*, (**73**), N.S., **8**, 7, pp. 659–733, 2 fig., 1 diag., 1 graph, 1959.

Some of the items of phytopathological interest in this report [cf. **37**, 5; **39**, 531] have been noticed. Specially promising among the chemicals tested in the field

against *Phytophthora infestans* on potato were 2 organic preparations based on maneb.

In inheritance trials of 363 F_2 plants from the 3rd back-cross of var. Lichti wheat selected for resistance to brown rust [*Puccinia recondita*] in 1957, 31% proved to be resistant, 57% segregating, and 12% susceptible. Of 2,400 F_2 plants from the 3rd back-cross of the resistant var. Probus, inoculated in the greenhouse after vernalization in the refrigerator, 243 were resistant.

Of 5 barley vars. tested, Ceresia and Wisa were the most resistant to *Erysiphe graminis*.

GLAESER (GERTRUD). **Das Auftreten wichtiger Schadensursachen an Kulturpflanzen in Österreich im Jahre 1959.** [The occurrence of important causes of injury to cultivated plants in Austria in the year 1959.]—*PflSchBer.*, **24**, 1–2, pp. 15–24, 1960. [Engl. summ.]

A report on the usual lines [cf. **38**, 559].

DUNIN (M. S.). Проблема иммунитета. [The problem of immunity.] –Защ. Раст., Москва [*Zashch. Rast., Moskva*], **5**, 1, pp. 59–60, 1960.

In Sept. 1959 the 3rd All-Union Conference on Plant Immunity was held at Kishinev. At the plenary sessions the question of the theoretical bases of plant immunity from the major diseases was considered. P. M. ZHUKOVSKIĬ presented a report on the botanico-geographical and genetical factors governing immunity and their use in selection, some of which has been noticed [**39**, 85]. T. SĂVULESCU spoke on the present state of phyto-immunological work in Romania and D. DODOV on that in Bulgaria. T. D. STRAKHOV alone and in joint reports with a number of colleagues dealt with the mechanism of physiological immunity, demonstrating the biological unity of the processes of mycelial disintegration in smut, rust, and other fungi in unfavourable ambient surroundings (in pure culture), as well as in the resistant plant. D. D. VERDEREVSKIĬ dealt with I. I. Mechnikov's conception of non-specific immunity and the role of plant antibiotics as immunity factors, and Mme F. V. KHETAGUROVA with their action in immunity from bacterioses: they are of interest as a basis for using antibacteriosis immunity in selection and seed breeding. Reports from M. V. GORLENKO, Mme T. I. FEDOTOVAYA, and M. S. DUNIN and his colleagues from China dealt with variability, parasitic specialization, and the phenomena of adaptation of phytopathogenic micro-organisms in which host properties are a decisive factor. The majority of reports from the plenary and section meetings are mainly concerned with the inherent immunity of the plant before contact with the causal agents of disease.

M. S. DUNIN (plant immunity from viruses) discussed the theoretical basis and regular factors and dealt with the practical significance of the defence reactions of active acquired immunity both from plant viruses and from the causal agents of other infectious plant diseases. K. T. SUKHORUKOV spoke on the ability of plants to develop specific toxin-inhibiting substances, in response, for example, to the introduction of fungus toxins. B. A. RUBIN surveyed the role of respiration and biochemical mechanisms involved in inherent immunity and defence reactions.

Specific problems were discussed in the sections. F. E. NEMLIENKO considered immunity in maize. Other subjects dealt with were the possibility of increasing resistance to diseases, increasing yield and improvement by developing resistant vars., the introduction of new methods of phytopathological testing, agrotechnical procedures, and chemical substances for increasing plant resistance to diseases. The basic paper on immunity in cereals was presented by É. É. GESHELE. Also considered were new methods for studying immunity, testing varietal resistance, methods for using micro-elements and other means and methods for improving immunological characters and yield in cereals. N. V. KOVALEV reported on

immunity in fruit crops and vines, describing the role of resistance in fruit crops to the most widespread and harmful diseases. The study and introduction of resistant vars. is the most important task in this field. The role of agrotechniques and chemical substances was also considered in relation to enhanced resistance. Results were presented by D. D. Verderevskiĭ *et al.* of improved methods for determining resistance in vines and the development of forms resistant to mildew [*Plasmopara viticola*] and powdery mildew [*Uncinula necator*].

The main results for vegetables and potatoes were reviewed by A. Y. Kameraz. The prospects of potato selection for resistance to fungus and virus diseases were discussed. Other contributors presented data on methods for testing potatoes for disease resistance, the assessment of a number of vars. for resistance to *Phytophthora* [*infestans*], wart [*Synchytrium endobioticum*], etc. The first results of work on the development of potato vars. resistant to viruses were described. Reports were presented on immunological studies in relation to vegetable growing. New laboratory methods have made quick preliminary determination of resistance possible. V. N. Shevchenko spoke on the attainments and prospects in developing sugar beet vars. combining resistance with other valuable agronomic characters. Results of researches on agrotechnical methods for increasing resistance of sugar beet to storage rot, etc., were presented.

Mme A. I. Solov'eva reviewed the historical development and the present state of immunological research, as well as describing the development of cotton vars. resistant to *Verticillium* and *Fusarium* wilts, giving the results of researches on the variability of the causal agents of these diseases. K. A. Voĭtovich & S. A. Safarov spoke on the elaboration and application of methods for creating an infection bank for varietal testing purposes and for the development of vars. resistant to gummosis [*Xanthomonas malvacearum*] by selection. The results of immunological researches on other crops, including soybean, cowpea, officinal plants, and trees were communicated.

Johnson (C. E.). **Annual Report of the Department of Agriculture, Northern Rhodesia, for the year 1959.**—24 pp., 1960.

In the Plant Breeding sect. (pp. 16–17) of this report [cf. **38**, 564] it is noted that the control of *Cercospora* [*Mycosphaerella arachidicola*] leaf spot on susceptible groundnut vars. with zineb and maneb increased production by 750 lb./acre.

In the Plant Path. sect. (p. 18) a severe yellowing of maize associated with slow growth during heavy rains is reported to have been widespread in the Central Province; it had much in common with the disease connected with Zn deficiency in S. Africa. The most serious pathogen on Turkish tobacco was *Cercospora* [*nicotianae*: cf. **38**, 656]; anthracnose (*Colletotrichum* [*tabacum*: **39**, 441]) occurred in fields and seedbeds, rosette [tobacco mottle virus+tobacco vein distorting virus] was unusually abundant, and mildew [*Erysiphe cichoracearum*] was locally severe.

Bates (G. R.). **Branch of Botany, Plant Pathology, and Seed Testing.**—*Rep. Minist. Agric. Rhod. Nyasald 1958–1959*, pp. 43–51, 1960.

In this report [mostly concerning S. Rhodesia: cf. **39**, 210] interesting new records include *Phytophthora palmivora* on bougainvillea, *Xanthomonas vignicola* on cowpea, *Verticillium dahliae* on cotton, *X. vasculorum* [map 3] on sugar-cane (N.Co. 310), and *Cystopus candidus* [*Albugo candida*] on radish.

Tobacco rosette virus [**37**, 134] is increasing in importance and appeared earlier than usual. A new virus on tobacco, causing distortion, was found to be transmitted both mechanically and by *Myzus persicae*.

Races of *P. infestans* involved in an unseasonal outbreak on potatoes in the Salisbury area in late Oct.–early Nov. were 1,4 and 1,3,4. The 1st report of

blackleg (*Erwinia atroseptica*) [**38**, 295] in a potato crop grown from locally produced seed was from the Eastern Districts.

Sudden and widespread outbreaks of cob- and stalk-rots of maize occurred, associated with *Diplodia zeae* [*D. maydis*: **37**, 135], *Fusarium graminearum*, and other *F.* spp.

D. macrospora [**36**, 380] was found for the 1st time on seed maize from the Mayoe Valley and N. Rhodesia. Increased incidence of maize streak virus was reported, and it is suspected that wheat is a susceptible host. Both summer and winter wheat crops at the Salisbury Exp. Sta. have been suffering from characteristic stunting, heavy tillering, and chlorotic streaking, particularly the vars. Gabo and Kenya F 93. The dominant race of *Puccinia graminis* on the summer wheat crop at Salisbury was 21; race 34 was also present.

Some new Barbados vars. of sugarcane were very susceptible to smut (*Ustilago scitaminea*); brown spot (*Cercospora longipes*) occurred on C.P. 29/291.

Gladiolus corms imported from Holland were severely attacked by *Sclerotium gladioli* and some from S. Africa by *Bacterium marginatum* [*Pseudomonas marginata*]. The perithecial state of *Erysiphe polygoni* on larkspur [*Delphinium* sp.] constituted a new record.

In spraying trials at the Rhodes Inyanga Orchards Cu oxychloride and 2–6–50 Bordeaux mixture were less phytotoxic to fruit and foliage of 4 apple vars. than cuprous oxide or 2–3–50 Bordeaux, all applied at 0·1% Cu content.

Good control of bitter rot [*Gloeosporium* spp.] of apples in areas of high rainfall was afforded by 3 applications of 0·15% maneb at 3-week intervals from late Oct., followed by 4 fortnightly sprays of Bordeaux (8 lb. 100 gal.), infection being reduced from 19·1% to 2·1%.

In a country-wide survey *Guignardia citricarpa* [map 53] was found latent in the leaves of old plantings of lemons and Valencia late orange, though no 'active' black spot was found.

Ascochyta pisi infection was heavier on peas grown with overhead irrigation than with flood irrigation.

Annual Report of the Department of Agriculture, Nyasaland, for the year 1958/9. Part II.—158 pp., 3 graphs, 2 maps, 1960. 7*s*.

Among the interesting new records made by D. C. M. Corbett (pp. 151–152) in this report [cf. **38**, 655 and above] is dieback and leaf spot of coffee caused by *Ascochyta tarda*, previously recorded only from Ethiopia and (?) Eritrea. Collections were made of *Fusarium equiseti* on *Crotalaria juncea*, *Elsinoe dolichi* on *Dolichos lablab*, *Cytospora* sp. (possibly conidial *Valsa eucalypti*) on *Eucalyptus saligna*, *Phleospora mori* on mulberry, *F. oxysporum* f. *nicotianae* on Burley tobacco, cucumber mosaic virus on passion fruit, causing woodiness disease [cf. **38**, 297], and *A. phaseolorum* on cowpea. Potato blight (*Phytophthora infestans*) [map 109] was found for the 1st time.

Agricultural Research.—*Rep. Indian Coun. agric. Res., 1955–56*, pp. 3–67, 1959.

In the sect. [cf. **34**, 81: **39**, 372] on rice (pp. 6–12) it is stated that *Helminthosporium oryzae* [*Cochliobolus miyabeanus*: **38**, 691] does not perennate in the soil but in stubble, where under certain conditions summer heat was withstood.

In the wheat sect. (pp. 12–19) details are given of varietal and progeny trials for resistance to black [*Puccinia graminis*], brown [*P. recondita*] and yellow rust [*P. striiformis*].

Much of the information in the mycology sect. (pp. 33–36) has been noticed [cf. **38**, 605; **39**, 73]. Tree cotton (*Gossypium arboreum*) is stated to be immune from cotton small leaf [virus: **39**, 373], but Uppam (H2919) and N.M.D. are susceptible. Strain Y of sugarcane mosaic virus is the only one so far identified.

VASUDEVA (R. S.). **Report of the Division of Mycology and Plant Pathology.**—*Sci. Rep. agric. Res. Inst. N. Delhi, 1955–1956*, pp. 85–104, 1958. [Received June 1960.]

Some information in this report [cf. **39**, 73, 372] has been noticed. In the plant pathology sect. (pp. 85–95) 2 new races of wheat brown rust (*Puccinia triticina*) [*P. recondita*] (1 resembling race 70) [**37**, 468] are recorded. A new virulent biotype (21A) of *P. graminis* race 21 [loc. cit.] was encountered, differing from it in its virulence on wheat vars. E. 535, E. 541, and E. 666. The wheat var. N.P. 785 was resistant to all the races of *P. glumarum* [*P. striiformis*]. Determination of the survival of *P. graminis* races in mixtures was begun. The combination 21+40 showed no appreciable change in the frequency of the 2 components through 6 generations. When race 72 was a component it was always suppressed in the 1st generation. Preliminary studies have demonstrated the presence of at least 2 races each of *Tilletia foetida* and *T. caries* on wheat, and 2 of *P. simplex* [*P. hordei*] on barley.

Downy mildew (*Sclerospora philippinensis*) [**36**, 241] of maize is not seed-borne, but perennates in underground parts of the plant. Ratoon sugarcane crops were generally more susceptible to *Colletotrichum falcatum* [*Glomerella tucumanensis*] than the plant crop.

Uromyces decoratus occurs on *Crotalaria juncea* in the uredo- and teleutospore stages only. Neither was able to survive the summer at Delhi and their mode of perennation is uncertain.

P. carthami [**39**, 332] is carried over as teleutospores with safflower seed, on crop debris, or by wild spp.

The pigeon pea vars. C. 15 (W.E.), P3, and P48 proved resistant to wilt (*Fusarium udum*), while N.P. 41 became susceptible for the 1st time after 12 yr.

The *Bacillus subtilis* antibiotic [**39**, 74] was produced in soils to which leguminous roots and glucose had been added, and remained stable in soil for 1 month. More antibiotic was produced in sterilized than in unsterilized soil. *F. udum* [**38**, 167] was reduced in severity when pigeon peas were grown in soil to which *B. subtilis* had been added.

Glucose-1-phosphate was again shown to play a part in the sporulation of *Lophotrichus ampulus* [loc. cit.]. When the mycelium was grown in sucrose at pH 4·8 no invertase activity was found. Sporulation was not inhibited on sucrose media in the presence of arsenate, benzimidazole, and thiouracil. *Phytophthora himalayensis* produced abundant oospores on oatmeal agar but practically none on a mineral salts-glucose medium+casein hydrolysate.

The numbers of fungi and actinomycetes in soil were increased by radioactive P (90–400 microcuries/100 g. soil), but no qualitative changes were detected.

Potato brown rot (*Pseudomonas solanacearum* [**38**, 274] and *P. s.* var. *asiatica*) was increased by high temp. (70–100° F.) and high soil moisture (50–100% water-holding capacity); pH 5·2–9·4 was tolerated by the pathogens *in vitro*.

Xanthomonas citri survived in infected leaves for 6 months, in sterilized soil for 52 days, and in unsterilized soil for 9 days.

In the plant viruses sect. (pp. 95–100) cross-inoculation tests are reported to have shown that phyllody in *Sesame* [**36**, 211] and *Crotalaria juncea* are caused by the same virus. On the Institute Farm incidence in *S. orientale* vars. was 4·5–15·8% and 25% in *S. alatum*. The virus causing [cape] gooseberry (*Physalis peruviana*) mosaic [cf. **35**, 280] was still infective after heating for 10 min. at 90° C., at a dilution of 1:1,000,000, and after storage for 30 days at 45°. Its experimental host range is given. A yellow mosaic virus of *Phaseolus aureus* was transmitted by *Bemisia tabaci* to *P. aureus*, *P. acutifolius*, *P. mungo*, and soybean, but not by sap inoculation. The disease affected 1% of *P. mungo* plants raised from seed under insect-proof conditions.

Spontaneous mutation in potato virus X produced 7 isolates differing in virulence from the parent str. The thermal inactivation point of tobacco distortion mosaic virus [tobacco mosaic virus str.] was 72-78°, the dilution end-point 1:60–1:200, and longevity 10 days at room temp. A single aphid (*Brevicoryne brassicae*) transmitted mosaic of *Brassica juncea* [turnip mosaic virus: **39**, 358] after 5 min. feeding, and the minimum period for transmission was 30 min.

The reduction in yield caused by groundnut mosaic [virus] was estimated to be 94·4%. Yields of papaw plantations should average 80,000–90,000 lb./acre but 2 estates infected by mosaic yielded only 36,000 lb. and 11,633 lb., respectively; the latter was infected in the seedling stage.

Incidence of little leaf of eggplant [**35**, 280] was reduced from 28·7% in control plots to 4·8, 7·2, and 2·3% in plots of 3 vars. sprayed weekly for 11 weeks with folidol (diethyl paranitrophenyl thiophosphate). Leaf curl of linseed and turnip were found to be caused by tobacco leaf curl virus.

New records in the systematic mycology sect. (pp. 101–102) included *Cercospora papayae* on papaw and *Alternaria solani* on *Hyoscyamus niger* and *Nicandra physaloides*.

Annual Report of the Director of Agriculture, British Guiana, 1959.—iii+76 pp. [Received July 1960. Cyclostyled.]

In this report [cf. **38**, 657] it is stated (par. 169) that of 126 rice vars. tested only Dima from Surinam had some resistance to blast (*Piricularia oryzae*) on an affected site. Losses were less than in 1958 and adequate control was afforded by 2 or 3 sprays of verdasan at 2 lb. 20 gal. applied with a mist blower at 8–10 gal./acre (par. 187). Brown spot (*Helminthosporium oryzae*) [*Cochliobolus miyabeanus*] was also widespread in the rice areas; recommended control measures included seed treatment with an organic Hg compound, burning the stubble after harvest, and spraying with verdasan (par. 188). In a survey of the major rice-producing areas hoja blanca [virus: **39**, 169] could not be detected. Var. 79, the principal one grown, was found to be resistant to the disease, but D. 110 is susceptible (par. 191). Against various seed-borne fungi arasan was the most effective of the seed dressings tested (par. 235).

On a citrus estate an outbreak of brown rot (*Phytophthora* sp.) was controlled by perenox at 5 lb. 100 gal., applied thoroughly over the whole tree with a motoblo sprayer (par. 227).

Coffee crops in the Pomeroon and NW. District, particularly from young trees, were reduced by nearly 50% by *Sclerotium coffeicola*. Applications of lime, N, and phosphate considerably increased resistance (par. 230).

Up to half the banana and plantain crops were damaged by moko disease (*Pseudomonas solanacearum*) (par. 231).

For the 1st time 'buba' or cushion gall disease of cacao [**39**, 223] was observed on I.C.S. clones at Plantation Providence, East Bank, Berbice and at Atkinson, East Bank, Demerara. *Marasmius perniciosus* occurred in old, rehabilitated plantations and *Phytophthora palmivora* caused considerable damage on many estates (par. 233).

Hill (J. B.), Overholts (L. O.), Popp (H. W.), & Grove (A. R.). **Botany.**—ix+571 pp., illus., N.Y., Toronto, London, McGraw-Hill Publishing Co. Ltd., 1960. 69*s*. 6*d*.

The 3rd edition of this lavishly illustrated college textbook has been rearranged and revised. Ten chapt. have been rewritten and all the others substantially changed. Sections on ecology and taxonomy have been added and those on physiology brought up to date. The work now includes a chapt. (pp. 366–375) on bacteria, viruses, actinomycetes, and slime moulds, and another (pp. 376–422)

on fungi. Some 65 fig. of the previous edition have been deleted and over 100 new ones added. A useful glossary is appended.

NORMAN (A. G.) (Editor). **Advances in Agronomy. Vol. X.**—xii+547 pp., 22 fig., 1 diag., 29 graphs, 15 maps, New York, Academic Press Inc., 1958.

Several chapts. in this vol. may be noted, in particular those by E. C. STAKMAN & H. A. RODENHISER (pp. 143–165), describing the history and present-day position of race 15 B of wheat stem rust (*Puccinia graminis* var. *tritici*) [**39**, 404] and measures for its control, L. H. ZIMMERMAN (pp. 257–288) on castor beans (*Ricinus communis*), and P. F. KNOWLES (pp. 289–323) on safflower (*Carthamus tinctorius*), which contain references to diseases attacking these hosts.

HORSFALL (J. G.) & DIMOND (A. E.) (Editors). **Plant pathology, an advanced treatise. Vol. III. The diseased population, epidemics and control.** —xiii—675 pp., 36 fig., 22 graphs, 1 map, New York & London, Academic Press, 1960. $22.

In this vol. [cf. **39**, 537] an editorial prologue, 'Inoculum and the diseased population', is followed by contributions from S. D. GARRETT, 'Inoculum potential'; A. E. MUSKETT, 'Autonomous dispersal'; L. BROADBENT, 'Dispersal of inoculum by insects and other animals, including man'; C. T. INGOLD, 'Dispersal by air and water—the take-off'; H. SCHRÖDTER, 'Dispersal by air and water—the flight and landing'; J. E. VAN DER PLANK, 'Analysis of epidemics'; P. E. WAGGONER, 'Forecasting epidemics'; E. GRAM, 'Quarantines'; R. B. STEVENS, 'Cultural practices in disease control'; W. A. KREUTZER, 'Soil treatment'; H. P. BURCHFIELD, 'Performance of fungicides on plants and in soil—physical, chemical, and biological considerations'; H. DARPOUX, 'Biological interference with epidemics'; and E. C. STAKMAN & J. J. CHRISTENSEN, 'The problem of breeding resistant varieties'.

Plant protection in New Zealand.—699 pp., 477 fig., Wellington, N.Z., the Government Printer, 1956. 25*s*. [53 ref.]

This is a belated notice of a well-produced book, covering all phases of plant protection. It is a collaborative publication by the staff of the Plant Diseases Div., D.S.I.R., Auckland. There are sect. on 'Fungous diseases', by R. M. BRIEN & JOAN M. DINGLEY; 'Bacterial diseases', W. D. REID; 'Virus diseases', E. E. CHAMBERLAIN; 'Physiological diseases', J. D. ATKINSON; 'Chemicals used in plant protection', H. JACKS & G. G. TAYLOR; and 'Soil disinfection, fumigation, and seed disinfection', H. JACKS. Appendixes cover, *inter alia*, 'Spray programmes', H. JACKS; 'Certification of therapeutants', G. H. CUNNINGHAM; and guides to fungicides used in plant protection and chemicals used in soil disinfection, fumigation, and seed disinfection. There is a glossary and a subject index.

DRACHOVSKÁ (Mme M.). **Prognosa a diagnosa v ochraně rostlin.** [Prognosis and diagnosis in plant protection.]—571 pp., 164 fig., 21 diag., 41 graphs, 20 maps, Prague, Czechoslovak Acad. agric. Sci., 1959. Bound 47.50 Kčs. [Numerous ref.]

Extensive material analysed in this book is arranged under theory and practice. The former includes general accounts of pests (pp. 21–69), diseases (pp. 69–95), weeds (pp. 96–101), abiotic factors (climatic, edaphic, and nutritional; pp. 101–118), and a critical survey of prognosis (pp. 118–130). The practical part contains chapts. on the determination of pests and diseases (pp. 131–225), including phytopathological statistics, forecasting, and map-making; on various methods used in prognosis (pp. 225–312); on auxiliary data based on agrometeorological, phenological, and bioclimatological observations (pp. 313–351); on prognosis proper (pp. 352–442), with *Cercospora beticola* as an example; and on the prognosis of pests and diseases of particular crops (pp. 443–546), concluding with a brief survey of the

forecasting and warning service in Czechoslovakia. Ample bibliographies follow each chapt.

Kosov (V. V.) & Polyakov (I. Y.) (Editors). Прогноз появления и учет вредителей и болезней сельскохозяйственных культур. [Forecasting and assessment in relation to pests and diseases of agricultural crops.]—631 pp., 90 fig., 2 graphs, Moscow, Min. Agric. U.S.S.R., 1958. Roubles 14.

This handbook contains contributions from many specialists immediately concerned with the elaboration of forecasting methods for specific pests and diseases. They are arranged in 11 main sect.: (1) basic methods for observing pests and diseases of agricultural crops (pp. 23–76); (2) large-scale polyphagous pests (pp. 77–248); pests and diseases (3–10) of: cereal crops (pp. 249–338), cotton (339–367), sugar beet (pp. 368–410), flax (pp. 411–446), fruit crops (pp. 447–519), vegetables and potato (pp. 520–575), fibre crops (pp. 576–584), and oleagenous and essential oil crops (pp. 585–599); and (11) parasites, predators, and diseases of harmful insects (pp. 600–626), with a 5-pp. list.

Muromtsev (S. N.), Samoĭlov (I. I.), Streshinskiĭ (M. O.), Berezovaya (Mme E. F.), & Smirenskiĭ (N. V.) (Editors). Достижения Мичуринской науки в микробиологии. [Achievements of Michurin's science in microbiology.]—229 pp., Moscow, Sel'khozgiz, 1958. Roubles 12.45.

This is a collection of papers on aspects of the application of Michurin's teaching in microbiology. K. S. Sukhov contributes one on 'The direction of variability of phytopathogenic viruses' (pp. 118–128), and F. Y. Gel'tser discusses the 'Importance of symbiotrophic fungi in plant nutrition' (pp. 172–180).

Bulloch (W.). **The history of bacteriology.** xii + 422 pp., 16 pl., 36 fig., London, Oxford University Press, 1960. 30*s*. [64 pp. ref.]

This is a reprint of a book first published in 1938 and for long out of print. Although there is a strong medical bias this book provides a valuable background both to the early history of bacterial diseases of plants and of fungi as pathogens.

Dunin (M. S.) & Kuvshinova (Mme E. V.). Капельный метод серодиагностики бактериальных и вирусных болезней растений. [The drop method for serodiagnosis of bacterial and virus diseases of plants.]—2nd ed., 27 pp., 12 fig., Moscow, K.A. Timiryazev agric. Acad., 1958. Roubles 0.40.

This brochure from Dept agric. Phytopath. and Exp. Sta. for Plant Protection describes the use of diagnostic sera from the Timiryazev agric. Acad. for phytopathological work in the laboratory, in teaching, and research establishments. The authors discuss 'Aims and problems in the use of the drop method for serodiagnosis in phytopathology and other branches of plant-growing', 'Theoretical bases and the main technical features of the drop method', 'The drop method for serodiagnosis of causal agents of plant bacterioses', and the 'Use of antivirus sera for virological analysis of plants'. The following practical methods are described for diagnosing plant pathogens: 'Determination of biological species of phytopathogenic bacteria obtained in pure cultures' with sera specific for *Erwinia aroideae*, *Pseudomonas cerasi*, *P.* [*Agrobacterium*] *tumefaciens*; 'Determination of strains (biotypes) of causal agents of root canker', i.e. *A. tumefaciens* strs.; 'Quantitative determination of antigenic specificity of bacterial strains'; 'Diagnosis of causal agents of bacterial diseases without isolating bacteria in pure culture' with sera specific for *E. aroideae* and *E. carotovora*; 'Determination of virus infection in vegetating plants involving [potato] virus X and TMV [tobacco mosaic virus]; 'Analysis of potato tubers for X virus infection'; 'Comparative determination of virus concentration in different plant organs by estimation of reaction intensity', and 'Determination of the virus titre in different plant organs'.

Gorlenko (M. V.). Критерий вида у фитопатогенных бактерий. [Criterion of the species in phytopathogenic bacteria.] –In *Omagiu lui T. Săvulescu* [see **39**, 667], pp. 259–264, 1959. [Roman. summ.]

A study at Moscow State Univ. dealing particularly with *Pseudomonas syringae* [cf. **39**, 271]; the criteria considered are host specialization in conditions approx. natural, geographical distribution of host and parasite, and a complex of physiological–biological properties.

Hayward (A. C.). **A method for characterizing Pseudomonas solanacearum.**— *Nature, Lond.*, **186**, 4722, pp. 405–406, 1960.

Cells of *Pseudomonas solanacearum* grown on an agar medium containing a readily utilizable carbohydrate take up the fat stain, Sudan Black B, using the method of Burdon (*J. Bacteriol.*, **52**, p. 665, 1946). This property is correlated with the presence in the cell of massive inclusions of poly-β-hydroxybutyric acid (Forsyth *et al.*, *Nature, Lond.*, **182**, p. 800, 1958; Hayward *et al.*, *J. gen. Microbiol.*, **20**, p. 510, 1959). At the Commonwealth mycol. Inst., Kew, this character was sought among the other pathogenic genera, *Xanthomonas*, *Pseudomonas*, *Agrobacterium*, *Erwinia*, and *Corynebacterium*. Apart from 43 strs. of *P. solanacearum*, poly-β-hydroxybutyric acid was present in *P. caryophylli* (3 strs.), *P. stizolobii* (2), *P. marginata* (2/4), and *P. viburni* (1). A further 63 strs. representing 33 *Pseudomonas* spp., 13 strs. of 4 spp. of *Erwinia*, and 13 strs. of 9 spp. of *Corynebacterium* did not contain sudanophilic cell inclusions under the conditions of test.

Two strs. of *P. solanacearum*, 1 from banana, 1 from tomato, showed a clearly defined colony variation from a fluidal (smooth) to non-fluidal (rough) colony form, which was correlated with virulence [**34**, 438]. On 2% sucrose-peptone agar cells of the fluidal colony form contained a higher conc. of poly-β-hydroxybutyric than cells of the non-fluidal form and stained more intensively with Sudan Black B. It is suggested that this staining technique when applied to smears of the milky exudate from the severed vascular bundles of potato, tomato, and banana would serve as a criterion in field diagnosis of infections due to *P. solanacearum*, and, for example, in the differentiation of the bacterial pathogens of the potato.

Volcani (Z.) & Palti (J.). **Pseudomonas solanacearum in Israel.** *Plant Dis. Reptr*, **44**, 6, pp. 448–449, 1960.

Field occurrence of *P. solanacearum* has been limited to potato [**28**, 79; **36**, 8] and is rare on tomato in the Hula Valley, though in inoculation tests tomatoes were very susceptible. No trace of the disease was found on groundnut, tobacco, eggplant, chilli, or banana. Israel isolates differed from American ones pathologically, morphologically, and biochemically. In the Hula Valley light to severe infections occur on the potato crop every year, on a variety of soils. Wilt incidence was less severe in the cooler autumn weather than in the hot spring and summer.

Franco Do Amaral (J.). **Caracteres bioquímicos do Xanthomonas manihotis e X. rubrisubalbicans e suas posições na chave de Burkholder (Schizomycetes, Pseudomonadaceae).** [Biochemical characters of *X. manihotis* and *X. rubrisubalbicans* and their positions in Burkholder's key (Schizomycetes, Pseudomonadaceae).] *Arq. Inst. biol., S. Paulo*, **25**, pp. 67–72, 1958. [Engl. summ. Received 1960.]

On the basis of a re-examination of the characteristics of starch hydrolysis, nitrite formation, and gelatin liquefaction, it is proposed that the positions of the 2 species in the key to the genus in the 7th ed. of *Bergey's Manual of Determinative Bacteriology*, 1957, should be altered, and suggestions for amendments to item II in the key for identification of *X.* are made.

Bucur (Elena). **Contribuții la studiul bacteriofagului bacteriilor fitopatogene.** [Contribution to the study of bacteriophages of the phytopathogenic bacteria.] —In *Omagiu lui T. Săculescu* [see **39**, 667], pp. 99–104, 1959. [Russ., Fr. summ. 23 ref.]

A report from Inst. agron. Res., Bucharest, on the bacteriophages of *Xanthomonas pruni* and *X. malvacearum* isolated for the 1st time in Romania.

Billing (Eve). **An association between capsulation and phage sensitivity in Erwinia amylovora.**—*Nature, Lond.*, **186**, 4727, pp. 819–820, 1960.

Among 150 isolates of this pathogen [cf. **39**, 457] examined at Nat. agric. advisory Service, Wye, Kent, the dominant type of colony, called 'typical', displayed characteristic markings on yeastrel peptone agar plates incubated at 30° C., the other, 'atypical', was relatively featureless and less opaque; there were intermediate strs. Indian ink with the phase-contrast microscope demonstrated that the cells of typical strs. had small capsules, some atypical strs. had none, and the rest varying proportions. Using a technique recently described [**37**, 291], further phages [**38**, 215] were isolated, of which 4S gave large (about 3 mm.) and 4L small (about 1 mm.) plaques on typical strs. and phage 23 small plaques on atypical strs. These features suggest that the sensitivity of typical and atypical strs. to these phages depends on the presence and the absence, respectively, of capsules.

Manigault (P.) & Stoll (C.). **Induction et croissance de tumeurs végétales exemptes de bactéries.** [Induction and growth of plant tumours free from bacteria.]—*Phytopath. Z.*, **38**, 1, pp. 1–12, 3 fig., 1 graph, 1960. [Engl., Germ. summ.]

Further studies [**38**, 565] at Inst. Pasteur, Paris, and Inst. Bot. Spéciale, Zürich, produced a method allowing a chemical fractionation of different compounds (nucleic acids, proteins, lipophilic substances) from *Agrobacterium tumefaciens* or from bacterial tumours induced on *Datura stramonium*. Following the application of 1 of these compounds or several together, the reactions of the host tissues are different. Pure DNA leads to a localized phenomenon due to suberization of the marginal tissues, but a mixture of nucleic acids and proteins can induce fast-growing tumours. The main difference between a bacterial and a germ-free tumour is that in the latter necrosis sets in after 4 weeks.

Robson (Hope H.), Budd (M. A.), & Yost (H. T.). **Comparison of the nucleic acid, total nitrogen, and protein nitrogen levels of normal and tumor tissue under similar growth conditions.** —*Plant Physiol.*, **34**, 4, pp. 435–440, 1959.

At Amherst Coll., Amherst, Mass., normal tissues of *Parthenocissus tricuspidata* and those infected by *Agrobacterium tumefaciens* were grown in tissue cultures containing 7-azaindole propionic acid. On a per-cell basis the tumour tissue contained about twice as much N, P, protein, and nucleic acid as the normal. As the growth rate altered, the differences between the 2 kinds of tissue were maintained but the absolute amount of protein and nucleic acid increased in each. The difference in the DNA contents of healthy and tumour tissues and the increases in amount caused by alterations in the growth rate are not considered to reflect changes in chromosome number. The results suggest the possibility of a rise in the level of non-chromosomal DNA.

Klein (R. M.) & Braun (A. C.). **On the presumed sterile induction of plant tumors.** —*Science*, **131**, 3413, p. 1612, 1960.

After a co-operative re-investigation at the N.Y. bot. Garden and the Rockefeller Inst., N.Y., it is concluded that the 1st author's previous claim [cf. **36**, 178 and below] that filtrates of crown gall bacteria [*Agrobacterium tumefaciens*] cultures induced tumours was not justified.

Stonier (T.). **Agrobacterium tumefaciens Conn. I. Release of P^{32} and S^{35} by labelled bacteria in vitro. II. Production of an antibiotic substance.**—*J. Bact.*, **79**, 6, pp. 880–888, 4 graphs; pp. 889–898, 10 fig., 1960.

At the Rockefeller Inst., New York, no evidence was obtained in support of the hypothesis that *A. tumefaciens* in culture containing extracts from previously wounded plant stem releases a specific deoxyribonucleic acid which is the tumour-inducing agent (Klein, R. M., *Brookhaven Symposia in Biol.*, **6**, pp. 97–114, 1954) [cf. above]. No correlation was observed between P^{32} release and tumour-inducing ability (Klein, R. M. *et al.*, *Cancer Res.*, **13**, pp. 499–502, 1953). When pathogenic, labelled bacteria were grown in plant extracts obtained from wounded stems, no increase in P^{32} release was noted.

An antibiotic substance, agrobacteriocin 1, produced by 2 strs. of *A. tumefaciens* inhibited the growth of 12 other strs. of the bacterium, and of *A. radiobacter* and *Bacillus subtilis*. The antibiotic did not appear to be correlated with the tumour-inducing ability of the bacteria.

Venkatraman (T. V.), Chatterji (S. M.), & Sharma (G. R.). **An entomogenous fungus (Empusa sp.) parasitic on the syrphid Sphaerophoria scutellaris F.**—*Curr. Sci.*, **29**, 6, p. 219, 1960.

A note on the infection of *S. scutellaris*, a common pollinating fly, by *Empusa* sp., which also attacked a few specimens of *Musca* in the same field.

Strong (F. E.), Wells (K.), & Apple (J. W.). **An unidentified fungus parasitic on the Seed-Corn Maggot.**—*J. econ. Ent.*, **53**, 3, pp. 478–479, 3 fig., 1960.

An unusual type of parasitism of imagos of *Hylemyia cilicrura* was found in Wis. in 1957. The diseased flies were easily recognized by the presence of a round hole on the mid-ventral surface of the abdomen. The hole was usually $\frac{1}{3}$–$\frac{1}{2}$ the max. width of the abdomen in diam. Occasionally there were 2 smaller holes, 1 on each side of the ventral midline. Apart from inducing complete sterility the pathogen did not appear to impair the health or activity of the insects.

In abdominal sections of 2 specimens the cavities were lined with a closely packed, palisade-like layer of rarely branched sporangiophores bearing at their apices uninucleate, obovate sporangia, 21–27 × 11–14 μ, resembling those of *Entomophthora exitialis* [**37**, 572] and *E. aphidis*. Beneath the layer of sporangiophores, interspersed among the remaining viscera, were dense clusters of multinucleate hyphal bodies with rounded ends, 7·5–17·5 μ approx. diam.

Schmidt (G.). **Pilzinfektionen bei Waldameisen-Puppen.** [Fungus infections of forest Ant pupae.]—*Naturwissenschaften*, **47**, 12, pp. 286–287, 1960.

This is a detailed report from the Institut für Angewandte Zoologie, Würzburg, Germany, on experiments to determine the mode of infection of *Formica polyctena* by fungus spores, e.g. of *Aspergillus* sp., which survive passage through the intestinal tract of the larvae and infect the pupa. At 28° C. mortality was heaviest at R.H. 77–88%.

Wain (R. L.). **Some chemical aspects of plant disease control.**—*Lect. Inst. Chem.*, *1959*, 22 pp., 6 fig., 1959. [137 ref.]

A critical survey of published work, preceded by an explanatory introduction and arranged under the main headings of investigations on fungicidal agents and systematic fungicides.

Frear (D. E. H.). **Pesticide handbook.**—265 pp., Pa State Coll., Coll. Sci. Publishers, 1960. Paper bound $1.75; cloth bound $3.25.

This revised 12th edition [cf. **38**, 662] lists nearly 8,000 commercial pesticides.

Amtliches Pflanzenschutzmittelverzeichnis und Pflanzenschutzgeräteverzeichnis 1960 der Bundesanstalt für Pflanzenschutz, Wien. [Official list of plant protectives and plant protection equipment 1960 of the Federal Institute for Plant Protection, Vienna.]—*Pflanzenarzt*, **13**, Sondernummer 1, 43 pp., 1960.

This publication follows the usual lines [cf. **38**, 566].

Richtlinien für die Pflanzenschutzarbeit 1960. [Instructions for plant protection work in 1960.]—*Pflanzenarzt*. **13**, Sondernummer 2, 25 pp., 1960.

These recommendations for plant pest and disease control in Austria follow the usual lines [cf. **39**, 378].

Hartisch (J.). **Untersuchungen über das Verhalten von Pflanzenschutzmitteln in der Pflanze und im Parasiten unter Verwendung markierter Atome.** [Investigations into the behaviour of plant protectants in the plant and in the parasite by the use of labelled atoms.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F., **14**, 2, pp. 26–32, 1960. [Russ., Engl. summ. 29 ref.]

A review, from the Biologische Zentralanstalt, Berlin, of recent advances in the radiometric investigation of herbicides, fungicides, and insecticides [cf. **39**, 545].

Miller (L. P.). **Factors influencing the uptake and toxicity of fungicides.**—*Trans. N.Y. Acad. Sci.*, Ser. 2, **21**, 5, pp. 442–445, 1959.

This paper is the substance of a lecture given in 1959 and it summarizes work done at the Boyce Thompson Inst., N.Y. [cf. **37**, 334; **39**, 543 *et passim*], over the past few years.

Somers (E.). **Fungitoxicity of metal ions.**—*Nature, Lond.*, **187**, 4735, pp. 427–428, 1 graph, 1960.

At Long Ashton Res. Sta., Univ. Bristol, experimental results suggested that most metal cations have a common, non-specific, fungitoxic action which is related to their strength of covalent binding to the surface ionogenic groups (e.g. imidazole, carboxyl, phosphate, or sulphydryl) present outside the cell protoplast. Much work with fungi, bacteria, and yeasts has shown that the initial uptake of cations [**39**, 379] is a surface phenomenon.

Deysson (G.) & Tran tan Thong. **Sur la cytotoxicité des mouillants.** [On the cytotoxicity of wetters.] *Ann. pharm. franc.*, **17**, 6, pp. 420–430, 1959.

Experiments were made at the Faculté de Pharmacie, Paris, with cequartyl A (cationic), also known as zephiran [**39**, 399] or zephirol, Na lauryl sulphonate (anionic), and tween 80 (non-ionic). Tween 80 inhibited wheat seed germination at 5×10^{-3} and seedling growth at 2×10^{-3} M, and at the higher conc. reduced the growth of pea roots, whereas onions were unaffected even at 2×10^{-3}. Used singly, each of the first 2 compounds inhibited mitosis in onion bulbs, while cequartyl A at 5×10^{-3} M did so in the roots, killing the cells in 3 days; mixed, their effects were purely additive. Tween 80 at 5×10^{-2}, added to cequartyl A at 5×10^{-6} M, reduced its toxicity.

Darby (R. T.). **Fungicide assay by spore germination in shaker flasks.**—*Appl. Microbiol.*, **8**, 3, pp. 146–148, 2 graphs, 1960.

At the Quartermaster Res. and Engng Command, U.S. Army, Natick, Mass., unsterilized 125 ml. Erlenmeyer flasks were filled in turn with suitable quantities of a buffer (0·025 M K phosphate at pH 6·8), culture substrate (0·1% sucrose+0·1% yeast extract), test fungicide (e.g. Na pentachlorophenate), and a spore suspension of *Myrothecium verrucaria* [**32**, 392] to provide a final conc. of $1–5\times10^5$ spores/ml. After shaking at 225 r.p.m. on a rotary shaker at 30° C. for 4 hr. the cultures were

either preserved in formalin or sampled and mounted in lacto-phenol+cotton blue and percentage germination calculated. A given spore was considered to have germinated when the germ tube was as long as its width.

The method has been successfully used with a number of fungicides including Cu 8-quinolinolate, ziram, and 2-mercaptobenzothiazole, and with a range of organisms, including *Memnoniella echinata*, *Alternaria tenuis*, and spp. of *Aspergillus* and *Penicillium*.

Bordeaux mixture.—*Agric. Gaz. N.S.W.*, **71**, 5, pp. 238–239, 246, 1960.

Instructions for the farmer on the ingredients and preparation of sprays and a paint of this fungicide.

Thizy (A.). **Preparation and bactericidal and fungicidal characteristics of chlorobiphenols, derivatives of chlorinated biphenyl.** —*Ind. chim. belge, 1959, Suppl.* 2, pp. 455–457, 1959. [*Chem. Abstr.*, **54**, 12, col. 12261 b, 1960.]

Of the 7 compounds examined for their effects on 3 bacteria and *Aspergillus niger* the most active was trichlorohydroxybiphenyl, but particular interest attaches to tetrachlorohydroxybiphenyl on account of its chemical, bactericidal, and fungicidal properties and its ease of synthesis. Textiles treated with the latter gave a satisfactory performance in the burial tests. It is readily incorporated into polyvinyl Cl. Both the compounds mentioned and 2 others proved to be relatively safe in toxicity trials on guinea-pigs.

Zentmyer (G. A.), Rich (S.), & Horsfall (J. G.). **Reversal of fungitoxicity of 8-quinolinol by amino acids and other chelators.**—*Phytopathology*, **50**, 6, pp. 421–424, 1960. [12 ref.]

This paper from Univ. Calif. Citrus Exp. Sta., Riverside, and Conn. agric. Exp. Sta., New Haven, enlarges on a preliminary note [**36**, 483].

Umnov (M. P.). Новые органические фунгициды. [New organic fungicides.]—Защ. Раст., Москва [*Zashch. Rast., Moskva*], **5**, 3, p. 54, 1960.

Novozir L (thiram) and novozir N (zineb), with 50% active substance, are new Czechoslovak fungicides, widely tested in the U.S.S.R. Czechoslovak reports indicate that 4 applications of novozir L against apple scab [*Venturia inaequalis*: cf. **39**, 234] gave 90% reduction of infection. Against vine mildew [*Plasmopara viticola*: **39**, 70] novozir N frequently gave better results than cupricol and Bordeaux mixture, as well as stimulating growth and ripening of the grapes. Infection of the leaves following treatment with 1% novozir N suspension was 10% less than after Bordeaux. Systematic use of novozir N, however, throughout the growing period resulted in an increase of oidium [*Uncinula necator*: cf. **39**, 368], against which it is ineffective. Novozir should, therefore, be used for spraying vines only up to flowering. Novozir N (1% solution) against *Phytophthora* [*infestans*: **39**, 338] on potato reduced infection by 65–80%, whereas cupricol at the same strength gave 70–85% reduction, and Bordeaux 59–63%; yield was increased by 23·5, 12, and 22·2%, respectively. At the conc. recommended (0·6–1%) it is almost harmless to plants and can be used in combination with DDT and phosphoro-organic preparations.

Ferenczy (L.) & Stefandel (I.). **Investigations on fungistatic activity of auxins.** —*Acta agron. hung.*, **8**, 3–4, pp. 167–170, 1958. [Russ. summ. Abs. in *Referat. Zh. Biol., 1960*, 8, p. 102, 1960.]

A study of inhibitory effects of β-indolylacetic, β-indolylbutyric, β-naphthoxyacetic, 2,4-D, and α-naphthylacetic acids on the growth of *Aspergillus niger* mycelium. Their activity, which has been compared with that of salicylic acid, rises in the given order.

Domsch (K. H.). **Die Wirkung von Bodenfungiziden. IV. Veränderungen im Spektrum der Bodenpilze. V. Empfindlichkeit von Bodenorganismen in vitro.** [The action of soil fungicides. IV. Changes in the spectrum of the soil fungi. V. Sensitivity of soil organisms *in vitro*.] *Z. PflKrankh.*, **67**, 3, pp. 129–150, 2 graphs; 4, pp. 211–216, 1960. [Engl. summ.]

In part IV [cf. **38**, 455; **39**, 273] compost soil was treated with 1 of 6 fungicides (captan, thiram, an As preparation, nabam, vapam, and allyl alcohol) and after 3 days the fungus flora was examined by dilution plating on peptone-glucose medium containing 30 p.p.m. streptomycin sulphate. Comparison with untreated soil indicated that allyl alcohol and vapam stimulated more fungi than they inhibited, while nabam markedly inhibited most fungal groups. *Rhizoctonia* [*Corticium*] *solani*, *Rhizopus nigricans* [*R. stolonifer*], and *Fusarium solani* were among the fungi most susceptible to treatment, while *Penicillium nigricans*, *Pullularia pullulans*, *Chaetomium* sp., and *Aspergillus versicolor* were particularly tolerant.

In part V the same fungicides were tested against representative groups of bacteria, streptomycetes, and fungi, the sensitivity of the individual organisms being calculated on the basis of the conc. giving 50–100% inhibition of growth in culture. There were no basic differences between the groups in their sensitivity to fungicides. The values for the individual organisms with a given fungicide varied widely.

Grossmann (F.) & Steckhan (D.). **Nebenwirkungen einiger Insektizide auf pathogene Bodenpilze.** [Side effects of some insecticides on pathogenic soil fungi.] *Z. PflKrankh.*, **67**, 1, pp. 7–19, 4 fig., 19 graphs, 1960. [Engl. summ.]

At the Inst. für Pflanzenpathologie und Pflanzenschutz, Univ. Göttingen, Germany, chlordane, lindane, and aldrin exhibited fairly high antifungal activity, decreasing in that order, against agar cultures of *Pythium* sp., *Ophiobolus graminis*, *Rhizoctonia* [*Corticium*] *solani*, and *R. crocorum* [*Helicobasidium purpureum*]. *O. graminis* on wheat was reduced considerably by soil treatment with chlordane at normal dosage (100 kg. ha.), less by aldrin [cf. **37**, 157], and less still by lindane: infection of cauliflower by *C. solani* was reduced by a 10-fold application of chlordane.

It is concluded that any effect of insecticides on fungus pathogens in the soil should be regarded as exceptional.

Roth (G.). **Beitrag zur Wirkung Hg-haltiger Beizmittel auf Gesundheitszustand von Samen und Keimling verschiedener Kulturpflanzen sowie auf die Physiologie der Jungpflanzen.** [A contribution to the effect of Hg dressings on the health of seeds and seedlings of various cultivated plants and on the physiology of the young plants.] *Höfchen-Brief*, **12**, 2, pp. 53–97, 29 fig. (1 col.), 1959.

Much of this work has been noticed [**38**, 363]. It is concluded that, owing to the presence of numerous moulds detrimental to germination and growth, Hg treatment is to be recommended for cereals even when the seed is known to be free from such pathogens as *Fusarium* spp., smuts, and *Helminthosporium gramineum*, and especially when soil conditions are unfavourable for germination. Moulds on seed of barley, oats, and maize are listed, and also those encountered on beet seed clusters.

Dishon (I.) & Netzer (D.). **Ḥittui neged 'holi-nofel'. Pe'ulat takhshire ḥittui shonim 'al maḥolele 'ḥoli-nofel', we hashpa'atam 'al ḥiyut ha-zera'im.** [Seed dressing against 'damping-off'. The action of various dressings in cases of 'damping-off' and their effect on seed germination.] *Hassadeh*, **40**, 9, pp. 1076–1080, 3 fig., 1960. [Heb.]

In 1957–60 lab. tests at the Plant Prot. Dept, Israel, with 7 commercial seed dressings, including 4 mercuric fungicides, against *Rhizoctonia* [*Corticium*] *solani* and *Pythium* sp. in relation to tomato, eggplant, pepper, and cucumber seed, showed that none was effective against both fungi. Most inhibited *C. solani*, but were

ineffective with *Pythium* sp., against which spergon was most promising. At the end of 1959 cerenox special was also tested, and found to inhibit both fungi. Albertan and cerenox special, however, totally inhibited germination of eggplant seed.

Bakosh (I.), Kochondi (A.), & Bordash (S.). Комбинированный протравливатель семян. [Combined seed-steeping machine.]—Меж. сел.-хоз. Ж. [*Mezh. sel.-khoz. Zh.*], **3**, 5, pp. 145–150, 1 fig., 1 graph, 1959.

This machine was developed at the Inst. for the Development of agric. Machinery, and the sci. Res. Inst. for the Mechanization of Agric., and built at the Factory for agric. Machinery, Szombathely, Hungary. It was designed for combined dry and wet treatments, special attention being paid to the grain being entirely covered in the dry treatment. The need for drying the seed after wet treatment is obviated; 200 centners of seed are treated per shift. Recommendations are made for the protection of personnel as a result of tests of the effects of chemical steeps.

Frindt (G.). **Ein Gerät zur Bestimmung der Schwebefähigkeit von Spritzmitteln.** [An apparatus to determine the suspensibility of spray chemicals.]—*NachrBl. dtsch. PflSchDienst, Berlin*, N.F., **14**, 2, pp. 32–37, 4 fig., 3 graphs, 1960. [Russ., Engl. summ.]

The apparatus described from the Versuchsstelle für Pflanzenschutz des VEB Berlin-Chemie, Teltow-Seehof [cf. **34**, 48], consists essentially of 6 upright (85 cm.) tubes, each with a tap at its base. Samples of a given spray suspension are placed in the tubes and at different time intervals the taps of the successive tubes are opened to release the sediments into shallow glass vessels. After evaporation to dryness the vessels are weighed. Graphs are made of sediment against time.

Building a Bes-Blo sprayer.—*Orchard., N.Z.*, **33**, 3, p. 83, 1960.

A detailed description is given of an orchard sprayer constructed by E. J. Freeman, Styx Mill Road, Papanui, near Christchurch, from a Bes-Blo fan unit and an F.x. 'Friend' pump. It is capable of pumping 19 gal. min. at 400 lb. pressure and it can be operated in rows as little as 11 ft. apart.

Sussex (I. M.), Clutter (Mary E.), Lutinski (Jane B.). & Dilks (Lois J.). **Extraction and biological properties of an antifungal fraction of woody plant tissues.**—*Bot. Gaz.*, **121**, 3, pp. 171–175, 1 fig., 1960.

At the Dept biol. Sci., Univ. Pittsburgh, Pa, pieces of secondary phloem of lilac, planted on agar medium, inhibited the growth of *Cytospora* sp., the inhibition being weakest at the cambial face and strongest at the oldest face of the tissue. Lilac phloem extracts also inhibited seed germination and root growth of cucumber. Ether was a suitable solvent for the active substance, which was destroyed by dialysis but not by autoclaving. Extracts from tissues other than phloem were only slightly inhibitory. Phloem extracts from 5 other tree spp. were less inhibitory than those from lilac. The antifungal activity of the older phloem cells parallels the poorer proliferations of such cells in culture.

Jung (J.) & Plempel (M.). **Über die Hemmwirkung des Gynäzeums bei Primula obconica auf Bakterien und Pilze. II. Versuche zur chemischen Isolierung der Narbenhemmstoffe.** [On the inhibitory effect of the gynaecium of *P. obconica* on bacteria and fungi. II. Attempts to isolate chemically the inhibitory substance in the stigma.]—*Phytopath. Z.*, **38**, 3, pp. 245–249, 1960. [Engl. summ.]

In further work [cf. **36**, 197; **37**, 410] at the Max Planck Inst. für Biochemie, Munich, 2 different inhibitory substances were chromatographically separated from the flower extract on kieselguhr, 1 in the petroleum-ether fraction and the other in the acetic-ester fraction. A method is described whereby the 2 inhibitory substances can be extracted in concentrated form.

Kalyanasundaram (R.). **Studies on an antagonist of the phytotoxin fusaric acid.**—*Phytopath. Z.*, **38**, 3, pp. 217–244, 4 fig., 3 diag., 1960. [Germ. summ.]

In further studies [cf. **37**, 681] at the Dept of Special Bot., Swiss Fed. Inst. Technol., Zürich, an antagonist, which reduced the antibiotic effect of fusaric acid derived from *Fusarium* [*bulbigenum* var.] *lycopersici*, was found in yeast extract and separated by adsorption on frankonite and subsequent elutions. The antagonist is also produced by *F.b.* var. *lycopersici* and *Colletotrichum fuscum*. It is capable of removing the toxicity of fusaric acid to tomato shoots.

Furushiro (K.), Shimizu (K.), Sakai (H.), Minogata (M.), & Fujisawa (T.). **Hygrostatin, a new antibiotic substance.**—*Iyaku Shigen Kenkyusho Nempo, 1958*, pp. 24–39, 1958. [*Chem. Abstr.*, **54**, 10, col. 10048 b, 1960.]

Full details are given of the extraction, from the mycelium of *Streptomyces hygrostaticus* sp. nov. on a starch maize-meal maize-steep liquor mineral medium, and purification of hygrostatin at the Inst. Pharmaceutical Resources, Tokyo. The pale yellow powder, which contained N, was soluble in methyl alcohol and almost insoluble in water. The antibiotic was stable in neutral solution at 100° C. for 30 min. Among the organisms which it inhibited at a low conc. were *Rhizopus nigricans* [*R. stolonifer*], *Alternaria kikuchiana* [cf. **36**, 487], *Macrosporium bataticola* [*Macrophomina phaseoli*], *Ophiobolus* [*Cochliobolus*] *miyabeanus*, *Sclerotinia mali*, and *Piricularia oryzae*.

Inouye (T.), Okamoto (Y.), & Nisikado (Y.). **Two isolates of Streptomyces albus antagonistic to Corticium centrifugum in unsterile soil, and a new antibiotic, imoticidin, produced by them in liquid and soil culture.**—*Ber. Ōhara Inst.*, **11**, 2, pp. 95–130, 1 pl., 2 diag., 20 graphs, 1959. [27 ref.]

Imoticidin, produced by isolates B 12–2 and C 1–2 of *S. albus* [**39**, 281], was strongly inhibitory to cultures of Gram+ bacteria, particularly *Bacillus subtilis*, yeasts, and some plant pathogenic fungi, including *Piricularia oryzae* and *Botrytis cinerea*.

Josifović (M.) & Miric (M.). **Contribution à l'étude des relations antagonistes entre Actinomyces sp. et les champignons parasites des végétaux.** [Contribution to the study of antagonistic relations between *A.* sp. and fungi parasitic on plants.]—In *Omagiu lui T. Săvulescu* [see **39**, 667], pp. 329–331, 1959. [Roman. summ.]

At Inst. Plant Prot., Belgrade, *Clasterosporium carpophilum* and *Cercospora beticola* were notably more sensitive to the antibiotic activity of actinomycetes in agar culture than *Fusarium blasticola*, *F. herbarum*, and *Botrytis cinerea*; *Aspergillus* sp. was not affected. Str. 16 2a of *Actinomyces globisporus* ssp. *violaceus* [*Streptomyces violaceus*] was the most active of the isolates tested.

Missirliu (Elisabeta) & Papacostea (P. P.). **Studiul unei tulpini de Pseudomonas denitrificans Bergey et al. cu acțiune antagonistă față de anumite ciuperci din sol.** [A study of a *P. denitrificans* str. acting as antagonist to some soil fungi.]—In *Omagiu lui T. Săvulescu* [see **39**, 667], pp. 451–461, 2 pl., 1959. [Russ., Fr. summ. 10 ref.]

A bacterium isolated from acid alpine soil and considered to be a str. of *P. denitrificans*, though differing from it in many respects, is described from the Comitetul geologic, Bucharest.

Inoue (Y.), Iizuka (Y.), & Tajima (T.). **Leather fungi. III. The antifungal activities of organic mercury compounds.**—*Nippon Hikaku Gijutsu Kyokaishi*, **4**, pp. 163–168, 1958. [*Chem. Abstr.*, **54**, 11, col. 11361 g, 1960.]

In *in vitro* tests at Univ. Kyoto, Japan, phenyl Hg formate, acetate, propionate, butyrate, valerate, and capronate, and methoxy-, ethoxy-, propoxy-, and butoxy

HgCl inhibited the growth of [unspecified] leather moulds at 5×10^{-6} as compared with 6×10^{-5} for Na pentachlorophenol. Saturated solutions of the foregoing compounds acted similarly on fungi on vegetable-tanned leather strips exposed to weathering for 6 months, but at 2×10^{-5} growth was arrested only by phenyl Hg propionate and propoxy- and butoxy HgCl. The hydrolytic rate at 25° C. in 10^{-5} M solutions was 17% for phenyl Hg formate, 12·6% for acetate, and 10% for butyrate. The hydrolytic rates of the alkoxy HgCl series were much smaller than those of the phenyl series and their surface tension was greater, making them more efficient as fungicides for leather.

Imschenezki (A. A.). **Mikrobiologie der Cellulose.** [Microbiology of cellulose.]—x+466 pp., 38 pl., 41 fig., 10 graphs, Berlin, Akademie-Verlag, 1959. [30 pp. ref.]

This is a revised edition of the author's 1953 monograph translated from Russian. The book is divided into 4 parts: 'Aerobic cellulose bacteria' (pp. 9–163); 'Anaerobic cellulose bacteria' (pp. 164–264); 'The distribution of cellulose bacteria' (pp. 265–379); and 'The practical importance of cellulolytic micro-organisms' (pp. 380–411). There is an authors' index (pp. 443–447), and a good subject index (pp. 448–466).

Inagaki (N.) & Ikeda (M.). **Studies on the fungi isolated from foods. I. Method for the isolation of the fungi in powdered foods. II. Identification of Penicillia and Aspergilli isolated from flours.**—*Bull. nat. hyg. Lab., Tokyo*, **77**, pp. 341–346, 2 graphs; pp. 347–366, 8 pl., 1 graph, 1959. [Jap. Abs. from Engl. summ.]

The method most suitable for isolating the fungi was to mix 1 g. of powdered food with 1% sterile solution of C.M.C. to make up 100 ml. suspension and shake in a sterile 200 ml. conical flask with glass beads. Then 1 ml. aliquots were plated out and incubated for 7 days at approx. 25° C. It was necessary to use 7·5% NaCl or acidified media for the selective isolation of fungi.

The fungi isolated from wheat, rice, soybean, and corn starch flours included 2,141 isolates from 35 flour samples, of which *Penicillium* (42·2%) and *Aspergillus* (29%) were the most predominant. The species are described in detail. The most frequent were *P. cyclopium*, *P. citrinum*, *P. chrysogenum*, *P. funiculosum*, *P. frequentans*, *A. glaucus*, *A. versicolor*, *A. flavus-oryzae*, and *A. candidus*.

Garber (K.). **Erfahrungen mit der Blattanalyse bei Rauchschadenuntersuchungen.** [Experiences with leaf analysis in investigations of smoke damage.] —*Angew. Bot.*, **34**, 1, pp. 33–37, 1960.

The results of the tests by the Staatsinstitut für Angewandte Botanik, Hamburg, on SO_2 [cf. **37**, 21], NO_2, NO_3, NH_3, F [cf. **35**, 533], and tar content indicate that microchemical qualitative analysis is useful especially for the determination of the causes of fresh damage, before the agents are chemically changed by the plant (e.g. SO_2 to SO_3), and for the detection of substances in abnormally high quantities or concs. The interference of dust, pesticides, etc. should be taken into account. The data obtained can be held conclusive only if the investigation of particular local conditions or a simultaneous analysis of air supports them.

Borsdorf (W.). **Beiträge zur Fluorschadendiagnostik. I. Fluorschaden-Weiserpflanzen in der Wildflora.** [Contributions to the diagnosis of fluorine damage. I. Fluorine damage in indicator plants in the wild flora.]—*Phytopath. Z.*, **38**, 3, pp. 309–315, 1960. [Engl. summ.]

As a result of observations over 3 yr. at the Forstbotanische Inst. der Technischen Hochschule, Dresden, Germany, a list of 59 spp. is presented, 4 susceptibility groups being distinguished on the basis of the macroscopic symptoms of F damage (necrosis on the leaf tips and margins, less frequently in the interveinal areas) [**38**, 491].

A list of national plant quarantine services.—13 pp., Rome, Plant Production and Protection Division, Food and Agriculture Organization of the United Nations, 1960. [Cyclostyled.]

This publication (FAO/59/12/8997) supersedes the previous list [**38**, 570].

Boalch (D. H.). **World directory of agricultural libraries and documentation centres.** 280 pp., Harpenden, International Association of Agricultural Librarians and Documentalists, 1960. 35*s*.

A record of 2,531 libraries specializing in agriculture and allied subjects. The list is arranged in alphabetic order of countries (over 100) and places (indexed), grouped under continents. For larger libraries date of foundation, number of volumes held and periodicals received, staff number, and system of classification are given. The Engl. subject index of specialist libraries is cross referenced for agricultural terms used in Fr., Germ., Russ., and Span.

Symposium on training for the future in plant pathology. Four invitational papers presented at the 51st annual meeting of APS.—*Phytopathology*, **50**, 7, pp. 500–516, 1960.

The titles are 'Qualitative and quantitative aspects of the graduate curriculum in plant pathology', by G. S. Pound; 'Recruitment of superior students in plant pathology', by J. W. Oswald; 'Improving the introductory courses in plant pathology' by R. B. Stevens; and 'The training of students for research in plant pathology', by G. L. McNew.

The assessment of crop losses caused by diseases and pests.—*Rep. agric. Res. Coun., 1958–59*, pp. 77–88, 1960. [20 ref.]

On pp. 77–82 of this paper, from the Plant Path. Lab., Min. Agric., Harpenden, work since 1950 on methods of measuring diseases of crops and on applying these in country-wide surveys is described. The aim was to determine the incidence of diseases in relation to seasonal and regional conditions and to ascertain the connexion between the severity of attack at particular stages of growth and yield loss at harvest [cf. **35**, 208: the published results have largely been noticed.] The diseases covered include potato blight [*Phytophthora infestans*: cf. **39**, 612], potato scab [*Streptomyces scabies*: cf. **34**, 811], cereal mildew [*Erysiphe graminis*: cf. **34**, 778], loose smut of cereals [*Ustilago* spp.: cf. **34**, 635], choke (*Epichloe typhina*) of cocksfoot [*Dactylis glomerata*] [cf. **33**, 726], clover rot (*Sclerotinia trifoliorum*) [cf. **38**, 212], apple scab [*Venturia inaequalis*: cf. **32**, 385], and *Verticillium* wilt of lucerne [*V. alboatrum*: cf. **37**, 297].

Dunin (M. S.) & Szépessy (L.). Очерк истории развития фитопатологии в Венгрии. [Essay on the history of the development of phytopathology in Hungary.] Воп. Ист. Естест. Техн. [*Vop. Ist. Estest. Tekhn.*], *1956*, 2, pp. 155–175, 6 fig., 1956.

In this paper from the Inst. for the History of nat. Sci. and Tech., Acad. Sci., U.S.S.R., some early conceptions of plant diseases and the emergence and development of phytopathology as a science are reviewed. Details are given of the roles and achievements of a number of prominent Hungarian phytopathologists of the 19th and 20th centuries, such as G. Linhart, G. Istvanffy, B. Husz, and K. Schilberszky. There is also a brief sect. on the 'Development of Phytopathology in the Hungarian People's Republic'.

Pavićević (Branislava). **Služba zaštite bilja u polnoprivrednim stanicama, njen rad i zadaci.** [Plant protection service in agricultural stations, its work and

duties.]—*Zasht. Bilja* (*Plant Prot., Beograd*), *1959*, 55, pp. 105–109, 1959. [Engl. summ.]

A report on the activities of the newly established Centre for the Improvement of Agric. Production of the People's Republic of Serbia, Beograd, in 1959 and an outline of its future tasks, including forecasting and identification of pests and diseases and advisory and supervisory duties.

Diercks (R.). **Der Warndienst als Instrument fortschrittlicher Pflanzenschutzberatung.** [The warning service as an instrument in progressive plant protection advisory work.] —*Prakt. Bl. PflBau*, **54**, 6, pp. 197–205, 1959.

A popular note on the plant disease warning service in Bavaria, with the conclusion that the present need is for extensive decentralization of the organization and for more observers, both paid and voluntary. Data should be processed rapidly to provide information useful at the local and regional level. Long-term forecasting would assist pesticide manufacturers.

Schaffnit (E.). **Über die Wechselbeziehungen zwischen Kulturpflanzen, ihren Parasiten und der Umwelt.** [On mutual relations between cultivated plants, their parasites, and the environment.]—In *Omagiu lui T. Săvulescu* [see **39**, 667], pp. 699–714, 1959. [Roman. summ.]

This extract from a larger work by the author [**37**, 391] reviews various aspects of phytopathology, including, *inter alia*, the influence of nutrition on the length of incubation, types of infection, various aspects of fructification, reactions of inoculated plants, effect of nutrients on resistance to diseases and on assimilation, and the age of the plant in relation to the incidence of disease.

Verderevskiĭ (D. D.). О возникновении у растений иммунитета к инфекционным заболеваниям. [On the build-up of immunity from infectious diseases in plants.]—In *Omagiu lui T. Săvulescu* [see **39**, 667], pp. 811–823, 1959. [Roman. summ. 2 pp. ref.]

A review from the Kishinev agric. Inst. of the progress made by Soviet scientists in this field [cf. **38**, 573]. It is noted *inter alia* that among vars. of cotton susceptible to gummosis [*Xanthomonas malvacearum*] and of tobacco susceptible to tobacco mosaic virus a very few plants (usually much under 1%) with phytoncidal properties were found which proved entirely resistant to inoculation.

Van Beverwijk (Agathe L.). **Fungus cultures and their role in phytopathological and industrial research.**—In *Omagiu lui T. Săvulescu* [see **39**, 667], pp. 57–60, 1 fig., 1959. [Roman. summ.]

The substance of this contribution has been noticed [cf. **39**, 85].

Boullard (B.). **Les mycorrhizes, présentation et explication des termes qui s'y rapportent.** [Mycorrhiza, presentation and explanation of the terms which relate to them.] —*Ann. sci. Univ. Besançon*, Sér. 2, Bot., **14**, pp. 97–120, 40 fig., 1959. [39 ref.]

General terms, those concerning ectotrophic mycorrhiza, and those relating to endotrophic mycorrhiza (42 in all) are described. [A reprint of *Bull. Soc. Hist. nat. Doubs* 61, 1957.]

Viennot-Bourgin (G.). **Les déformations provoquées par les Ustilaginales.** [Deformations caused by the Ustilaginales.]—In *Omagiu lui T. Săvulescu* [see **39**, 667], pp. 91–97, 1959. [Roman. summ.]

This paper from Inst. Nat. agronomique, Paris, groups various types of deformation under local traumatisms (galls, tumours), general traumatisms (smuts, rots), nanism, and gigantism.

THIND (K. S.) & RAWLA (G. S.). **Studies on the nutrition of fungi. III. The influence of different sources of carbon on the growth of three anthracnose fungi. IV. The influence of different sources of nitrogen on the growth of three anthracnose fungi.** —*Proc. Indian Acad. Sci.*, Sect. B, **28**, 6, pp. 373–378, 1958; **29**, 3, pp. 101–108, 1959.

Of the 20 compounds examined at Amritsar [cf. **36**, 445] as the sole sources of C for *Gloeosporium psidii* [*Glomerella cingulata*] from guava, *G. piperatum* from chilli [*Capsicum*], and *Colletotrichum* sp. from citrus, dextrose, fructose, D (+) mannose, melezitose, and raffinose gave best mycelial growth, while all 6 inorganic N sources gave good growth except nitrites. The fungi utilized nitrate, ammonium, and organic sources of N, but not atmospheric. Nearly all amino acids, except L-cystine, gave fair to good growth.

OKU (H.). **Biochemical studies on Cochliobolus miyabeanus. II. Enzymes concerning amino acid utilization. (Part 2.) On the transaminase and the amino acid decarboxylase.**—*Forsch. Pflkr., Kyoto*, **6**, 4, pp. 126–131, 2 graphs, 1959.

In further studies at the Takamine Lab., Sankyo Co. Ltd., Shinagawa, Tokyo [cf. **39**, 217], *C. miyabeanus* was found to contain glutamate-pyruvate, aspartate-ketoglutarate, valine-pyruvate, and alanine-ketoglutarate transaminases, which were inhibited by iodacetate, hydroxylamine, and heavy metals. The opt. pH of the transaminase was 7–8. Of amino acid oxidase, amino acid decarboxylase, and transaminase only the last appeared concerned in the amino acid utilization of *C. miyabeanus*. Glutamic decarboxylase, the only amino acid decarboxylase found, behaved as in higher plants.

JOHNSON (W. H.) & CROSSAN (D. F.). **The effect of maneb on the oxygen uptake of Colletotrichum capsici in the presence of substrates found in oxidative pathways.**—Abs. in *Phytopathology*, **50**, 8 (1), p. 572, 1960.

With intermediates or starting products of glycolysis, the citric acid cycle, or the hexomonophosphate shunt as the single C source in a basic mineral medium the mycelium from spores of *C. capsici* was grown for set periods in shake culture and its O uptake then measured over 80 min., with or without 1,000 p.p.m. maneb (70%). The difference in percentage O uptake of maneb-treated mycelia in relation to untreated was for galactose and fructose, 0; glucose, −50%; mannose, −56%; pyruvate and citrate, 0; succinate, −43%; and fumarate, +37%. A block between succinate and fumarate and possible interruption in phosphorylation of glucose and mannose is thus indicated.

FRIES (N.). **Nonanal as a growth factor for wood-rotting fungi.** *Nature, Lond.*, **187**, 4732, pp. 166–167, 2 fig., 1960.

At the Inst. Physiological Bot., Univ. Uppsala, nonanal (pelargonic aldehyde) [cf. **37**, 274] added to a liquid culture medium strongly promoted growth of *Stereum sanguinolentum*, more so in a synthetic medium than in malt agar. *Daedalea unicolor*, *Polyporus cervinus*, and *P. applanatus* [*Ganoderma applanatum*] showed little or no response.

When nonanal was introduced as a gas into plates of 1·5% agar inoculated in the centre by placing near the edge a small cup containing 5% or 1% nonanal in 'tween 40', all the test spp. were affected, particularly *G. applanatum*, which formed a thick wall of interwoven aerial hyphae round the cup.

In preliminary trials other wood-rotting fungi including *Polyporus* [*Fomes*] *fomentarius*, *Mycena metata*, *M. adonis*, *Coprinus narcoticus*, and *Boletus variegatus* also responded to nonanal.

PHAN-CHON-TON. **Nouvelles observations sur les substances capables de stimuler la formation d'éthylène par le Penicillium digitatum.** [New observations on the

substances capable of stimulating the production of ethylene by *P. digitatum*.] —*C. R. Acad. Sci., Paris*, **251**, 1, pp. 122–124, 1960.

In experiments at the Sta. du Froid, Bellevue, C.N.R.S., the most copious production of $CH_2:CH_2$ was ensured by the enrichment of a synthetic medium containing glucose and saccharose as sources of C with alanine, glycerol, or ethanol.

Jerebzoff (S.). **Répercussion du rythme endogène sur la croissance des conidiophores fertiles de Monilia fructicola au cours de l'apparition des zonations et modifications provoquées de ce rythme.** [Repercussions of the endogenous rhythm on the growth of the fertile conidiophores of *Sclerotinia fructicola* during the appearance of the zonations and changes caused by this rhythm.]—*Ann. sci. Univ. Besançon*, Sér. 2, Bot., **12**, pp. 23–32, 3 diag., 8 graphs, 1958.

Experiments at the Lab. de Phytohormones, Toulouse, France, demonstrated that as a rule the growth of the fertile conidiophores of *S. fructicola* [**39**, 387] adheres to the endogenous rhythm of zone formation which has a basic period of 24 hr.

Kvashnina (Mme E. S.). Первичная люминесценция грибов из рода фузариум [Primary luminescence of fungi of the genus *Fusarium*.] Бюлл. н.-т. информ. Всес. н.-и. Инст. Вет. Сан. [*Byull. n.-t. inform. Vses. n.-i. Inst. Vet. San.*], *1958*, 3, pp. 50–51, 1958. [Abs. in *Referat. Zh. Biol., 1960*, 10, p. 109, 1960.]

In studies of 229 *F.* cultures (20 spp.) and 40 cultures of other spp. lilac, azure, or orange primary fluorescence was noticed in 17%. There was no direct association of luminescence with toxin formation, which was intense during growth of *F.* on maize and oats, but weak on straw.

Beck (T.) & Röschenthaler (R.). **Strahlenbiologie der Mikroorganismen.** [Radiation biology of micro-organisms.]—*Bayer. landw. Jb.*, **37**, 2, 82 pp., 15 graphs, 1960.

This review from the Landesanstalt für Landkultur und Moorwirtschaft, Munich, Germany, covers the physical bases of irradiation biology, the significance of microorganisms in this field of research, the effect of irradiation on cells and organisms, metabolic changes resulting from exposure, chemicals preventing or restoring irradiation damage, and practical aspects. The bibliographies following the various sections are of particular value, all entries being either annotated or abstracted.

Beraha (L.), Smith (M[arion] A.), & Wright (W. R.). **Gamma radiation dose response of some decay pathogens.**—*Phytopathology*, **50**, 6, pp. 474, 476, 1960.

The results of further studies by agric. Marketing Service, U.S. Dept Agric., Chicago, Ill. [cf. **39**, 172, 617], on 21 spp. of fungi are tabulated. Cultures on Tochinai and Czapek media and inoculated fruits and vegetables were irradiated at 1,000,000-2,000,000 rads hr. over a dose range of 25,000–1,000,000 rads, and examined for resumption of growth. *Phytophthora infestans* and *Phomopsis* [*Diaporthe*] *citri* [loc. cit.] proved extremely sensitive, *Cladosporium* sp., *Gloeosporium* spp., *Rhizopus nigricans* [*R. stolonifer*], *Stemphylium radicinum*, *Alternaria* spp., and *Diplodia natalensis* less so. Sensitivity in culture was not always the same as on the host.

Masago (H.). **Studies on the effects of the radiation on microorganisms. (6) On the survival curves of Colletotrichum lagenarium irradiated with ultraviolet light.** —*Forsch. PflKr., Kyoto*, **6**, 4, pp. 136–138, 2 graphs, 1959. [Jap. Abs. from Engl. summ.]

Uniform conidia from a single sporodochium of *C. lagenarium* exposed to UV light in further studies at the Coll. Agric., Kyoto Univ [cf. **39**, 277], provided a survival

curve which dropped suddenly at 40,000 μ w/sec./sq. cm. In such a curve for conidia from several sporodochia there were discontinuous points, which were attributed to the difference in resistance of conidia at different growth stages.

Krasil'nikov (N. A.). Микроорганизмы почвы и высшие растения. [Soil micro-organisms and higher plants.]—463 pp., 83 fig., 5 diag., 8 graphs, Moscow, published by the Acad. Sci. U.S.S.R., 1958. Roubles 24.50. [38 pp. ref.]

This very detailed monograph is divided into 4 sect.: 'Basic information on the structure and development of micro-organisms and their classification' (pp. 9–136), 'The soil as a habitat for micro-organisms' (pp. 137–213), 'Biological factors of soil fertility' (pp. 214–274), and 'The interaction of soil micro-organisms and plants' (pp. 275–422).

Novogrudskiĭ (D. M.). Почвенный гумус и микробиологические факторы его образования. [Soil humus and microbiological factors in its formation.]—95 pp., 1 pl., 4 graphs, Alma-Ata, Acad. Sci. Kazakh. S.S.R., 1959. Roubles 4.55. [5 pp. ref.]

In chapt. 5 (pp. 66–89) of this monograph the author discusses 'Initial microbiological processes of humus formation', with results of his own researches in sects. on 'Formation of humic substances as the result of autolysis of fungal bodies', 'Formation of humic substances in the process of the life history of fungi', 'Study of the chemical features of dark-staining products', 'Formation of humic substances in the process of the life history of actinomycetes', and 'Formation of humic substances in the process of the life history of soil bacteria'.

Tupenevich (S. M.). Повышение устойчивости озимой пшеницы и столовой свеклы к заболеваниям приемами обработки почвы по Т. С. Мальцеву. [The increase in resistance of winter Wheat and table Beet to diseases by working the soil according to T. S. Mal'tsev.]—Сборн. Раб. Инст. прикл. Зоол. Фитопат. [*Sborn. Rab. Inst. prikl. Zool. Fitopat.*] 5, pp. 175–194, 1958.

Deep ploughing by Mal'tsev's methods (Sel'khozgiz, 1954) was carried out in 2 fields at the Pushkin exp. Base, All-Union sci. Res. Inst. for Plant Protection, N.W. zone. Under winter wheat the percentage of plants infected by *Fusarium nivale* [*Calonectria nivalis*; **38**, 590] was reduced from 23·8 to 18·2 in 1955 and from 17·5 to 12·9 in 1956; with organo-mineral fertilizer infection was reduced from 28·7 (shallow ploughed) to 19·5% by deep ploughing, compared with a reduction of 42·5 to 35% without fertilizer. Three consecutive disk cultivations of the surface soil of 2-yr.-old perennial grass at 10-day intervals to a depth of 10–12 cm. in summer with subsequent deep tilling depressed incipient causal agents of diseases of beet and other crops, such as *Rhizoctonia* [*Corticium*] *solani*, *R.* [*Moniliopsis*] *aderholdii*, and *Pythium debaryanum*, present in the soil.

Ross (D. J.). **Physiological studies of some common fungi from grassland soils.**—*N.Z.J. Sci.*, **3**, 2, pp. 219–257, 1960. [54 ref.]

At D.S.I.R., Wellington [cf. **39**, 675] fungi isolated from tussock-grassland and introduced pastures included *Rhizoctonia* sp., *R.* [*Corticium*] *solani*, and other mycelia sterilia, and *Cylindrocarpon radicicola*, *Fusarium culmorum*, *F. sambucinum* var. *caeruleum*, and *F. oxysporum*. All the isolates grew well at 16–24° C. at pH 5–8 but the fusaria best at 28°. Thiamin or 'pyrimidine' were required by a *C. solani* str. and the mycelia sterilia. Sporing fungi generally utilized a wider range of C substrates than the non-sporers, which utilized glucose very efficiently. Nearly all isolates utilized pectin, hemicellulose, and cellulose. *C. radicicola* and fusaria utilized acids of the Krebs' citric acid cycle and simple aromatic compounds

from lignin very efficiently. Of the N compounds, NO_3, NH_4 compounds, proteins, nucleic acids, uric acid, and generally purines were utilized. The nutritional properties of *C.* sp. and *F.* spp. were similar and had a wider range than those of the mycelia sterilia and *R.* spp., which themselves resembled each other. Strs. of any particular sp. did not vary markedly in their nutrition. It is concluded that the nutritional and growth characteristics of soil fungi are of considerable ecological importance.

Saksena (S. B.). **Effect of carbon disulphide fumigation on Trichoderma viride and other soil fungi.**—*Trans. Brit. mycol. Soc.*, **43**, 1, pp. 111–116, 1960.

In further studies at the Bot. School, Univ. Cambridge [cf. **35**, 487], samples of Kettering loam fumigated with 0·05–20 ml. CS_2 250 g. soil were plated out at intervals after fumigation in Evans soil recolonization tubes. *Trichoderma viride* [cf. **37**, 649], which became dominant after fumigation with 0·05–0·1 ml., was less tolerant than *Penicillium nigricans* and *P. citrinum* and much less than the highly resistant *Aspergillus fumigatus*, *A. fischeri*, *P. luteum*, and several unidentified spp. The frequency of *T. viride* as a recolonizer of fumigated soils is attributed as much or more to its high growth rate as to its tolerance of CS_2.

Johnston (A.). **A supplement to a host list of plant diseases in Malaya.**—*Mycol. Pap.* 77, 30 pp., 1960. *7s. 6d.*

Included in this supplement to the previous list [**34**, 548] are new records made between 1950 and 1958, together with a few previously omitted.

Sawada (K.). **Descriptive catalogue of Taiwan (Formosan) fungi. Part XI.**—*Spec. Publ. Coll. Agric. Taiwan Univ.* 8, 268 pp., 12 pl., 1959.

Parts 1 to 11 of this work were issued before 1945 [cf. **13**, 398; **14**, 532]; parts 12–15 are still to come. This part, edited by R. Imazeki, N. Hiratsuka, & H. Asuyama, is arranged as were the previous lists and the specimens listed are preserved at Taiwan Univ. and the Nat. Sci. Museum, Tokyo.

Sandu-Ville (C.), Lazăr (A.), & Hatmanu (M.). **O nouă contribuție la cunoașterea micromycetelor din R.P.R.** [New contribution to the knowledge of the micromycetes of the Romanian People's Republic.]—*Lucr. ştiint., Iaşi, 1959*, pp. 195–207, 1959. [Russ., Fr. summ.; 23 ref.]

A note from agron. Inst., Iași, of 79 spp., grouped as saprophytic and parasitic, hitherto unknown in Romania, or noticed on new hosts, or previously recorded but referred to in the lit. as occurring on other hosts.

Cejp (K.). **Flora ČSR. Oomycetes I.** [Flora of the Czechoslovak Republic. Oomycetes I.]—477 pp., 168 fig., 1 graph, Prague, Czechoslovak Academy of Sciences, 1959. Kčs 52.50. [28 pp. ref.]

This well-produced vol., based on the author's own studies of collections chiefly from W., S., and Central Bohemia, deals with the Saprolegniales (pp. 24–279), Leptomitales (pp. 280–326), and Lagenidiales (pp. 327–465). Spp. recorded elsewhere in Central Europe and N. America, which on the strength of ecological and other criteria are likely to occur in Czechoslovakia also, are included; marine representatives, absent from Czechoslovakia, are also noted to complete the picture. Identification keys in Latin are appended.

Golovin (P. N.). Обзор родов семейства **Erysiphaceae.** [Review of the genera of the Erysiphaceae.]—Сборн. Раб. Инст. прикл. Зоол. Фитопат. [*Sborn. Rab. Inst. prikl. Zool. Fitopat.*] 5, pp. 101–139, 12 fig., 1958.

After discussing the systematic position of the family [**37**, 400] and expressing opinions on the specific and intraspecific differences, the author reviews in detail

the 12 gen. he recognizes, including 2 new ones, *Blumeria* Golovin (for *Erysiphe graminis*), and *Linkomyces* Golovin (for *E. communis*) [both without Latin diagnoses]. There is a key and a list of gen. with synonyms.

Komarova (Mme E. P.). К систематике трутовых грибов (сем. **Polyporaceae**). [On the systematics of the polypores (fam. Polyporaceae).] –Докл. Акад. Наук БССР [*Dokl. Akad. Nauk B.S.S.R.*], **3**, 11, pp. 463–467, 1959.

A brief critical review of classifications used for the Polyporaceae.

Ellis (M. B.). **Dematiaceous hyphomycetes : I.**—*Mycol. Pap.* 76, 36 pp., 22 fig., 1960. 10*s*.

In this paper, dealing with the genera *Acarocybe*, *Acarocybella*, *Pithomyces*, and *Corynespora*, *Sporidesmium bakeri* [cf. **39**, 221] is reduced to synonymy under the comb. nov. *P. chartarum* (Berk. & Curt.) M. B. Ellis.

Siepmann (R.) & Johnson (T. W.). **Isolation and culture of fungi from wood submerged in saline and fresh waters.** *J. Elisha Mitchell sci. Soc.*, **76**, 1, pp. 150–154, 1960. [18 ref.]

In further work [**39**, 134] at the Marine Lab., Duke Univ., Durham, N. Carol., wood panels sterilized by autoclaving (1 hr.) and exposure to propylene oxide (24 hr.) were submerged in coastal and estuarine waters, brackish and fresh, for periods of 52–117 days. Subsequently the invaded wood was used as inoculum on 2 media: a modified Meyers' medium containing yeast extract 1 g., cellulose 5 g., glucose 5 g., agar 20 g. l. raw sea water—a bacterial inhibitor (rose bengal or potassium thiocyanate), or Höhnk's medium containing glucose and K_2HPO_4, 0·5 mg. each, NH_4NO_3, $(NH_4)_2SO_4$, and $MgSO_4$, 0·025 mg. each, and agar 10 g., added to a water extract of Irish moss (*Chondrus crispus*).

Thirty fungi of 22 gen. were isolated and except for *Trichocladium* sp. and *Stemphylium lanuginosum* all occurred on the sea-water panels [cf. **39**, 750] from salinity ranges of 26·3–29‰. Most of the identified spp. were 'terrestrial' fungi, including *Alternaria tenuis*, *Cladosporium herbarum*, *Curvularia lunata*, *Epicoccum purpurascens* [*E. nigrum*], *Torula herbarum*, and *Pullularia pullulans*. These fungi either penetrated the wood cell walls or grew within the wood elements.

Ciferri (R.). **Tentative arrangement of the conidial stages of Tilletiaceae.**—In *Omagiu lui T. Săvulescu* [see **39**, 667], pp. 175–180, 1959. [Roman. summ. 11 ref.]

A proposal from Univ. Pavia for taxonomical rearrangement, according to the conidial states, with the establishment of a new family, Entylomellaceae. Some auxiliary binominals or new combinations are proposed and a new genus, *Savulescuella*, is described for the conidial states of *Doassansia* and *Tracya*.

Khokhryakov (M. K.). Изменчивость фитопатогенных грибов. [Variability of phytopathogenic fungi.] *Ex* Труд. Конференции «Наследственность и Изменчивость Растений, Животных и Микроорганизмов». [Trans. Conference 'Heredity and Variability of Plants, Animals, and Micro-organisms'], Moscow, Acad. Sci. U.S.S.R., pp. 433–439, 1959.

The results are given of work by collaborators at the A. A. Yachevskiĭ Lab. for Mycol., All-Union sci. Res. Inst. for Plant Protection, with spp. of *Puccinia*, *Erysiphe*, *Claviceps*, *Rhizoctonia*, and *Ascochyta*. The conclusions reached were that fungi vary in response to changes of life, especially in relation to the substratum, ecological conditions, geographical origin, etc. The present classification is inadequate, as it disregards the variability factor, while inessential labile characters are often used as specific and even generic criteria. The factors to be considered should

preferably be identity, similarity or genetical relationships. Ontogenetic methods are better than statistical procedures for studying fungi.

Baxter (J. W.). **Morphologic variation in Puccinia menthae.**—*Lloydia*, **22**, 3, pp. 242–246, 9 fig., 1959.

As a result of morphological studies at Univ. Wis., the new vars. *P.m.* var. *cordillerensis* Baxter on *Monardella*, *P.m.* var. *rugosa* Baxter on *Bystropogon mollis*, and *P.m.* var. *levis* Baxter on *Satureja odora* are distinguished from *P.m.* var. *menthae* on *Mentha*.

Nelson (R. R.). **Evolution of sexuality and pathogenicity. I. Interspecific crosses in the genus Helminthosporium.**—*Phytopathology*, **50**, 5, pp. 375-377, 1960.

In further studies at N. Carol. State Coll., Raleigh [cf. **39**, 395], of 2,366 interspecific crosses of related *H.* spp. 50 were successful, representing 13 different crosses of 8 spp. of which the perfect state was either *Cochliobolus* or else unknown, though probably *C.* Though viable ascospores were obtained from 9 of the 13, the numbers of asci and spores produced varied very much. Back crossing showed some of the ascospore progeny to be fertile with 1 or other of the parental strains, others with neither. Some of the progeny of *H. maydis* × *H. oryzae* [*C. miyabeanus*] were pathogenic to either rice or maize, others to both.

Karling (J. S.). **Host range and host reactions as diagnostic criteria in Synchytrium.** —Abs. in *Science*, **130**, 3386, p. 1418, 1960.

In the greenhouse at Purdue Univ., Indiana, *S. macrosporum* was induced to infect 630 spp. of 460 gen. of 138 fam. of gymnosperms and angiosperms. The galls formed ranged from simple unicellular to composite multicellular, both types sometimes developing on one host. Host reaction appears to be specific only for specific organs of a particular host.

Drachovská (Mme M.) & Šandera (K.). **Membránová konduktometrie ve fytopatologii.** [Membrane conductometry in phytopathology.]—*Ann. Acad. tchécosl. Agric.*, **32**, 3, pp. 365–372, 1959. [Russ., Germ. summ. Abs. in *Referat. Zh. Biol., 1960*, **12**, p. 201, 1960.]

A description is given of methods for detection of disease [**38**, 170] and evaluation of pesticides and fungicides, particularly Cu compounds. Leaves were examined through filter paper; suspensions and extracts from plant material were measured in special vessels with electrodes fixed in their walls. These techniques permit the early detection of diseases before development of visible symptoms and provide an indication of host resistance.

Isaac (P. K.). **A whole-mount technique for studying infected leaves.**—*Phytopathology*, **50**, 6, pp. 474–475, 3 fig., 1960.

This method, suitable for portions or thick sections of leaves and for small roots or stems, was evolved at Univ. Man., Winnipeg, Canada. Fixing portions ca. 5 mm. sq. in 95:5 dioxan–propionic acid (reagent grade), 5 ml./portion, in a corked flask at 60° C. until the leaves are colourless (up to 24 hr.) is followed by washing in distilled water for at least 3 hr. and mounting in haem-gum staining mountant [**38**, 247]. Penetration of the specimen and clearing are generally complete within a week. Examination through the thickness of a leaf may need adjustment of the microscope tube length to overcome aplantic error, best achieved with an optical tube length corrector (Watson, 313 High Holborn, London, W.C. 1).

Roeder (M.) & Roeder (Rachel H.). **On the culture of Panus stypticus.**—*J. Elisha Mitchell sci. Soc.*, **76**, 1, pp. 143–146, 2 fig., 1960.

At Dept Biol., Womens' Coll. Univ. N. Carol., though luminescent cultures of

P.s. var. *luminescens* were obtained on water-saturated bread and quick growth in shake cultures of malt extract, the most rapid growth, combined with good luminescence and ease of harvesting, was obtained from cultures growing on the outside of dialysis bags containing malt extract solution. The addition of hydrogen transfer agents, such as 10^{-3} M reduced diphosphopyridine nucleotide, flavine monophosphate, quinone, and dihydroxyphenylalanine, always diminished light production.

Serological studies of commercially produced plant-virus antisera.—*Phytopathology*, **50**, 6, pp. 428–431, 1960.

The American phytopath. Soc. Committee on Virus Type Culture Collection (chairman H. H. McKinney, Plant Industry Sta., Beltsville, Md) reports the progress in the commercial production of plant virus antisera; data from serological tests of such virus antisera produced by Microbiological Associates, Bethesda, Md, are tabulated and the plant viruses for which specific antisera are now in use in the U.S.A. and Canada listed, together with the procedure for obtaining such antisera.

Maramorosch (K.). **Leafhoppers (Cicadellidae) as vectors and reservoirs of phytopathogenic viruses.** – In *Omagiu lui T. Săvulescu* [see **39**, 667], pp. 421–442, 1959. [Roman. summ. 2 pp. ref.]

Evidence is presented from Rockefeller Inst., New York, of the multiplication of 5 plant viruses in their leafhopper vectors, much of it arising from work on aster yellows virus in *Macrosteles fascifrons* [**38**, 470, 501], maize stunt virus in *Dalbulus maidis* [**39**, 168], and wound tumour [clover big vein] virus in *Agallia constricta* [**37**, 401]. Since many phytopathogenic viruses can maintain themselves solely in insects, it is inferred that leafhoppers constitute natural reservoirs of potential infection for a wide range of plant spp. The wider host range of vector-transmitted viruses among plants as compared with arthropods suggests an adaptation to the animal host of longer standing.

MacKinnon (J. P.). **Combined transmission by single aphids of two viruses that persist in the vector.**—*Virology*, **11**, 2, pp. 425–433, 1 fig., 1960.

At the Entom. and Plant Pathol. Sect., Canada Dept Agric., Fredericton, N.B., individuals of *Myzus persicae* which had acquired potato leaf roll virus from *Datura tatula* were subsequently able to acquire and transmit turnip latent virus [*Physalis floridana* yellow net virus: cf. **35**, 500] from *P. floridana* with the same facility as controls which had not acquired leaf roll virus. Similarly, others which acquired yellow net could subsequently acquire and transmit leaf roll virus. Furthermore, aphids fed on a plant infected by both viruses acquired and transmitted each virus independently [cf. **38**, 202].

Kovačevsky (I. C.) [Kovachevski (I. Kil.)]. **Untersuchungen über ein in Bulgarien am Stechapfel (Datura stramonium) vorkommendes Virus.** [Investigations on a virus occurring on Thorn-apple (*D. stramonium*) in Bulgaria.]—In *Omagiu lui T. Săvulescu* [see **39**, 667], pp. 383–392, 6 fig., 1959. [Roman. summ.]

At the Inst. Plant Prot., Sofia, a virus causing leaf deformation, vein-clearing, dappling, and dwarfing of *D. stramonium* plants in the local botanical gardens was found to be transmissible by *Myzus persicae* and *Doralis* [*Aphis*] *frangulae*; its thermal inactivation point was 59° C., dilution end point 1:50,000, and viability *in vitro* over 20 days. It is considered to be a new str. of tobacco etch virus.

Annual Report of the West African Cocoa Research Institute, 1958–59.—87 pp., 1 pl., 1 fig., 5 graphs, 1 plan, 1960. 5*s*.

Work at Tafo Sta., Ghana, on virus diseases, cushion gall, black pod (*Phytophthora*

palmivora), and minor fungus diseases is covered on pp. 16–30 of this report [cf. **38**, 357]. R. Attafuah notes that twigs and chupons of cacao trees infected by swollen shoot virus [**39**, 684] are brittle and break cleanly, while healthy twigs break with a typically ragged 'greenstick' fracture. This 'brittle twig' symptom is sufficiently characteristic to be classed as a secondary diagnostic feature.

J. W. Blencowe summarizes observations on 1,300 cacao trees planted at random in uneconomic groups and coppiced in 1958. Symptom-bearing shoots developed from the stumps of 95 of 150 trees known to be virus-infected, while the remainder died; 57 of 334 trees growing in contact with infected trees, and 93 of 816 presumed to be healthy, produced infected chupons. Further work is needed on the latent period of the swollen-shoot type of virus.

J. W. Blencowe & A. A. Brunt have established a series of field experiments to study the effects of virus infection on the growth and yield of in-bearing trees. The 1st group covers inoculations and another the effect of natural infection by severe swollen shoot virus (about 20% of the trees were known to be infected at the outset) on trees grown with and without compound fertilizer, with observations on the effect of routine capsid spraying on the yield and growth of the trees [cf. **38**, 315].

A. Attafuah & J. W. Blencowe report on the progress of the isolated virus outbreak at Gandorhun, Sierra Leone [**38**, 560], discovered during a survey of about 100 peasant farms. The symptoms resemble those of a number of mild viruses isolated from cocoa in other parts of W. Africa, but there is as yet no definite evidence of relationship. The outbreak may have arisen from introduced infected plant material, but it is more likely that it stems from natural infection from an adjacent old *Ceiba pentandra* tree.

Cushion galls [**39**, 222] were found by A. A. Brunt very occasionally in only 10 localities, and it seems that the disease (of unknown cause) is not more common than it was in 1935 [1925: cf. **6**, 145].

Spraying trials by A. L. Wharton against black pod (*P. palmivora*) gave no indication that such control would be profitable in Ghana at present [cf. **39**, 657], though the continued extension of improved methods of cultivation, together with capsid control, is leading to heavier crops and, therefore, more pods exposed to infection. Very high yields, up to 2,000 lb. dry cacao/acre, have recently been reached in the Amelonado spacing trial in which shade has been completely eliminated and fertilizer applied. Further work on pod susceptibility [**38**, 358] was focused on the question whether diseased cherelles would have reached maturity without wilting if protected from *Phytophthora* by chemical spraying. The data indicated that infection of young cherelles is accompanied by a reduction in the number which subsequently wilt.

P. D. Turner obtained isolates of *P. palmivora* from a number of sources in order to assess their relative importance as potential disease inocula in the field. Old husks appear to be of very little importance in the epidemiology of black pod, as noted by Dade [**11**, 702]. Over 8 months the pathogen was isolated only twice from detritus and once from bark, though the trunk may be an important source of inoculum of wound-infecting fungi. Diseased tissues, mainly from fruits, of 58 plant spp. were examined for *P. palmivora*. Fruits of *Gmelina arborea* were heavily infected throughout the early months of crop production, and this may be of importance where this tree is used for shade. The fungus has not apparently been recorded on this genus. *Herrania* sp. was also found infected. The soil has been found to be a source of *P. palmivora* [cf. **39**, 562]; in continuation of previous observations [**35**, 168] healthy pods were buried at 7 sites in different types of soil. Lesions occurred irregularly despite the apparently widespread distribution of the fungus, and it would seem that some fungistatic factor is operating in conjunction with soil moisture; of other fungi isolated *Cylindrocladium scoparium*, apparently not hitherto recorded from Ghana, was the most frequent, causing rapidly spreading

lesions with a depressed centre and copious spore development. *Botryodiplodia theobromae* and *Fusarium* spp. were also frequently isolated. The limited saprophytic activity of *P. palmivora* was shown by its failure to penetrate more than 0·5 cm. in several soils, both sterile and unsterile, when pieces of infected pod were placed in soil samples in Petri dishes. It was clear that development in the soil, except from a food base, was inhibited. Aqueous extracts of 8 different types of soil permitted copious zoospore formation and germination in Petri dishes, and on occasion more so than in deionized water. Ether extracts of soils, however, were markedly fungistatic, but this effect could be nullified by the addition of aqueous pod extracts to the soil solutions; drops of moisture from pods also stimulated spore germination. This suggests that soil splashes are a major source of inoculum of *P. palmivora*, particularly in the initiation of disease outbreaks. Experiments on the duration of viability in the same soils indicate that the fungistatic effect is not fungitoxic. *P. palmivora* was found to be a highly competitive saprophyte when green pod material was added to unsterile soil. Thus, although old husks are unimportant as a source of inoculum, green ones may for a limited period be of considerable importance.

Information on strs. of *P. palmivora* from various localities has already been noticed [**39**, 685].

An experiment to determine the influence of virus infection on *P. palmivora* pod lesions demonstrated significant differences ($p = 0{\cdot}05$), apparent from the earliest lesion measurements, both between pods from trees containing different virus isolates and between pods from virus-infected and uninfected trees. Lesions in pods from trees infected by severe New Juaben and Bisa isolates were significantly larger than those in control pods.

A. L. Wharton reports *P. palmivora* infection on the leaves of mature trees and young shoots in Ghana. The symptoms so closely recall the common tip necrosis of flush leaves on mature cocoa in the British Cameroons [**38**, 358] that the disease there is almost certainly attributable to *Phytophthora*.

In an investigation of minor fungus diseases isolations were made from fruits at all stages of development. Diseased ripe pods yielded numerous fungi, mostly saprophytes or weak parasites, in addition to the *Fusarium* spp. which were the only isolates from diseased cherelles and immature pods. Inoculation tests with isolates of *Trachysphaera*, *Botryodiplodia*, and *Pestalotiopsis* showed that these fungi do not infect unwounded pods, and that development is faster in ripe than in unripe fruits.

Work at the Ibadan sub-station on virus research and 'die-back' is reported on pp. 59–72. J. M. Thresh has compared isolates from some of the many outbreaks of swollen shoot disease in Nigeria. Leaf symptoms showed consistent differences in type and severity and were usually associated with swellings on the roots and stem, or on the roots alone. Isolates from widely different localities showed the greatest differences in symptom expression, and the fact that they rarely protect against each other indicates that they are not closely related. As some supposed strs. have proved to be in fact mixtures, the more intensively studied isolates are now being carried on by repeated single insect passages in an attempt to obtain the stable cultures necessary for more precise work. Both the mild and severe strs. from Egbeda are now giving consistent symptoms, but with single insect transfers the usual symptoms of the severe strs. often do not appear until the 2nd flush after germination. Attempts are being made to determine whether individual mealybugs can simultaneously transmit related strs. and how quickly these are resolved on successive passages.

As the effects of viruses on growth may be used as criteria of relationship (cf. Harrison [**37**, 463]), data are presented of the results of inoculation of bean [*Phaseolus vulgaris*] with different isolates of swollen shoot virus separately and together and

their effect on subsequent growth of leaf area compared with controls. The results, which indicated mutual interference between some isolates and independent behaviour of others, support Holmes's general hypothesis [cf. **36**, 170] that unrelated pathogens usually have cumulative effects when inoculated together, and it may be that this method will be of greater value in determining str. relationships than the usual cross-protection tests. The chief disadvantage of the growth tests is the large number of replicates required and the considerable insectary space taken up. Furthermore, mealybug inoculation is a tedious procedure.

Observations on the effect of capsid control on the general condition of swollen shoot-infected stands have been noticed [**38**, 315]. The results of monthly inspections over several consecutive years of all trees in the Ibadan and Ilaro areas, abandoned in consequence of mass infection, are summarized under the headings 'Symptom expression', 'Rate of virus spread', and 'Pattern of virus spread'.

C. K. H. Martini gives a detailed account of cacao necrosis virus [**38**, 359]. The occurrence of necrotic symptoms is influenced by the isolate, the distance between the grafted patch and growing shoot, and the season. This virus occurs in *Cola nitida* areas, but evidence of its possible susceptibility is still insufficient. Attempts to transmit the virus by soil, root contact, or seed have so far failed.

In experiments with a leaf-tissue grafting technique [cf. **26**, 298] 1-yr. cacao seedlings inoculated and then cut back developed symptoms in 6–8 weeks, compared with 5–6 months where no cutting back was done. Four-week seedlings developed symptoms 8 weeks after grafting, and 2-week seedlings after 6 weeks. When pieces of leaf tissue were inserted into the radicles of cocoa beans symptoms developed in the 5th week after grafting. Only tissue from mature leaves with fully developed symptoms was suitable as inoculum.

D. Kay summarizes studies on die-back of cocoa (*Calonectria rigidiuscula*) [**38**, 315]. No evidence has been found to support the contention that occluded lesions can burst out to cause die-back during periods of stress. It is believed that factors encouraging the regeneration of the tree have some controlling influence on the spread of existing die-back. Use of Owen's inoculation technique [cf. **36**, 10] has provided valuable information on the behaviour of the fungus in cacao tissue, but variable results were achieved with plants growing under identical conditions, and the development of the fungus can only be measured by destroying the host. On mature trees, however, a multiple inoculation technique produced a die-back which could be measured and did not destroy the host.

In the report of the W. African Fungicides Res. Unit by P. O. Park & E. C. Hislop (pp. 80–83) already noticed [**39**, 213], the procedure for the bioassay of fungicides on cacao pods is described in detail and the results summarized. Initial results of studies on particle size and uniformity of deposit after field spraying are also briefly outlined.

Pady (S. M.) & Kramer (C. L.). **Kansas aeromycology. VII. Smuts.**—*Phytopathology*, **50**, 5, pp. 332–334, 1 graph, 1960.

In further studies at Kans. State Univ., Manhattan [**39**, 382], 2 groups of smut chlamydospores were prominent in 403 daily samples between Sept. 1956 and Aug. 1958, one of small, smooth spores (5–7 μ), either *Ustilago hordei* or *Sphacelotheca sorghi*, and another identified as *U. maydis*. There was considerable day-to-day variation but the main peaks were in June and July [cf. **37**, 704]. Daily nos./cu. ft. were 5–371 (generally below 100) in summer and 1–23 in winter.

Stakman (E. C.). **The need for international co-operation on cereal rusts.**—In *Omagiu lui T. Săvulescu* [see **39**, 667], pp. 745–754, 1959. [Roman. summ. 17 ref.]

In this paper from Univ. Minn. the rust situation, chiefly in America, is reviewed and some control measures on an international basis are suggested [cf. **38**, 457].

HASSENBRAUK (K.). **Die Getreiderostsituation in Europa, kein kontinentales, sondern ein interkontinentales Problem.** [The cereal rust situation in Europe—not a continental, but an intercontinental problem.]—In *Omagiu lui T. Săvulescu* [see **39**, 667], pp. 275–281, 1959. [Roman. summ.]

This paper from Institut für Botanik, Brunswick, Germany, analyses the geographical distribution of *Puccinia graminis* [f.sp.] *tritici*, *P. triticina* [*P. recondita*], and *P. glumarum* [*P. striiformis*] in Europe [cf. **38**, 737], emphasizes the significance of the rust situation in Africa and the adjacent parts of Asia, and advocates large-scale international co-operation [cf. above].

KOSTIĆ (B.). **The cereal rusts in south-eastern part of Yugoslavia in 1958 and 1959.** —*Robigo, 1959*, 9, pp. 8–16, 1 map, 1959. [Span. translation.]

A report of 2 rust surveys by the Wheat Breeding Centre, Kragujevac, the 1st in June 1958, restricted to Serbia [**39**, 565], and the 2nd in June 1959, covering Macedonia also. Data are presented on the rusts of wheat, barley, oats, and rye. *Puccinia graminis* may be serious on wheat, but is of little account on other cereals; *P. rubigo-vera* [*P. recondita*] may also cause losses in wheat, but *P. glumarum* [*P. striiformis*] is of little account. The extent of *P. hordei* on barley is little known, but *P. coronata* attacked oats heavily in 1959 and is a potential threat. *P. dispersa* [*P. recondita*] on rye is of no account.

SPASIĆ (MALIŠA) & MILADINOVIĆ (N.). **Otpornost nekih sorti ozime Pšenice prema populaciji rasa Puccinia graminis iz Istočne i Jugoistočne Srbije.** [Resistance of some varieties of winter Wheat to the population of races of *P. graminis* from the E. and S.E. Serbia.] —*Arh. poljopr. Nauk.*, **13**, 39, pp. 46–53, 1960. [Engl. summ.]

At the Inst. Farm Husbandry, Beograd, and Field Crops Exp. Sta., Zaječar, Yugoslavia, none of the 91 indigenous and foreign vars. inoculated with uredospores were immune [cf. **36**, 391]. Taking an av. for 1958 and 1959, the very susceptible included the widespread Rumunska crvenka (93·5% diseased), Kruševačka 22 (85·6), Prolific (83·6), and Bankut 1205 (80·4); moderately to largely resistant, Chinese 166 × Lin Calel (44·9), No. 159 from Bulgaria (44·2), Italian vars. Est Mottin (39), Verna (35), and Elia (22·1), and the local var. Dunavka (27·7). Data are given to show that the generally higher incidence in 1959 than in 1958 was correlated with the weather [cf. above].

SUNESON (C. A.). **Genetic diversity—a protection against plant diseases and insects.** —*Agron. J.*, **52**, 6, pp. 319–321, 1960. [14 ref.]

Using data on the infection of barley, oats, and wheat by stem rust [*Puccinia graminis*] in California [**36**, 387], the author, working at the Agronomy Dept, Univ. Calif., demonstrates the value of the buffering effects of genetic diversification in contrast to pure lines and proposes breeding methods, with examples, giving multigenic resistance in multiline vars., thus providing for the race diversity, dispersal, and dilution of the pathogens.

VALLEGA (J.) & CENÓZ (H. P.). **Variations in the population of P. graminis tritici in Argentina in the period 1938–58.**—*Robigo, 1959*, 9, pp. 17–18, 1 graph, 1959. [Span. transl.]

Important changes in the relative abundance of the races of *Puccinia graminis* are reported from the Inst. de Fitotecnia, Castelar. Race 17 G [cf. **36**, 92], infrequent some years ago, has become the most prevalent in its group, attacking new wheat vars. previously considered resistant to race 17. Various entities were noted within group 15, and races 11 and 42 also constituted complex groups. Group 17 was the most prevalent during the period analysed, although in some years it was equalled

or surpassed by group 15, and between 1953 and 1955 by races of type 11. The gradual disappearance of race 42 has been very remarkable.

Basile (Rita), Leonore-Ossicini (Agnese), & Levine (M. N.). **Another rare physiologic race of P. graminis tritici of possible scientific interest.**—*Robigo, 1959*, 9, pp. 19–23, 1959. [Ital., Span. transl.]

The authors report the identification of race 20 of *Puccinia graminis* [**39**, 687] from an infected wheat specimen from Bradia Polesine in the Province of Rovigo, Venezia Euganea, Italy.

Basile (Rita). **Rassegna di razze fisiologiche di Puccinia graminis var. tritici isolate da Berberis vulgaris L. e B. aetnensis Presl., raccolti in Italia durante l'estate 1957.** [Data on physiologic races of *P.g.* f.sp. *tritici* isolated from *B. vulgaris* and *B. aetnensis* collected in Italy during the summer of 1957.]—In *Omagiu lui T. Săvulescu* [see **39**, 667], pp. 37–42, 1 graph, 1959. [Engl., Roman. summ. 19 ref.]

This information has been noticed [**39**, 163].

Hart (J.). **New Wheats for 1960 sowings.**—*Qd agric. J.*, **86**, 2, pp. 79–81, 2 fig., 1960.

A new race of wheat stem rust [*Puccinia graminis*: **39**, 17] recently damaged the Gabo and Charter vars. hitherto resistant in Queensland. It was very timely, therefore, that the Qd Dept Agric. and Stock should have had available the newly named rust resistant vars. Kenora and Hopps, which have been released following many yr. of testing at Warwick and Toowoomba.

Sikka (S. M.) & Rao (M. V.). **Inheritance studies in Wheat. III. Inheritance of field reaction to black rust.**—*Indian J. Genet.*, **18**, 1, pp. 34–40, 1958. [*Biol. Abstr.*, Sect. A, **35**, 11, p. 2511, 1960.]

Resistance to black rust [*Puccinia graminis*: **40**, 10; see below] was dominant in N.P. 790, when crossed with N.P. 718, and recessive in crosses with Pb. C. 281 and Pb. C. 591 at the Indian agric. Res. Inst., New Delhi. A 3:1 ratio was obtained from N.P. 718×N.P. 790, while from Pb. C. 281×N.P. 790 and Pb. C. 591×N.P. 790 it was 61 susceptible:3 resistant. Reversal of dominance of resistance of N.P. 790 is explained by assuming the Pb. C. 281 and Pb. C. 591 carry 2 dominant epistatic genes for susceptibility in the field.

Choudhuri (H. C.). **The inheritance of stem and leaf rust resistance in common Wheat.**—*Indian J. Genet.*, **18**, 2, pp. 90–115, 1958. [*Biol. Abstr.*, Sect. A, **35**, 11, p. 2509, 1960.]

The resistance to stem rust [*Puccinia graminis*: **39**, 97 and above] races 11 and 11–1 is controlled by 2 genes which are in common in Mentana-Rhodesian and Kenya 360H. Two genes govern resistance to race 15B–3 in both vars., while 2 other genes control their resistance to 15B–4. These 2 genes, however, confer similar resistant reactions to 15B–3, but are presumed to be different because they give entirely different reactions in individual seedlings within the same F_3 families. A gene governing resistance to races 15B–1 and 56 is present in both these wheat vars. In Thatcher a recessive gene governs resistance to 56, and 2 genes govern immunity from 29–1 and 48–1 (= 48A). One gene controlling resistance in Selkirk to leaf rust [*P. recondita*: **38**, 318] races 5a and 15a is epistatic to a gene in Mentana-Rhodesian.

Kaul (R.) & Shaw (M.). **The physiology of host-parasite relations. VI. Oxidation-reduction changes in Wheat leaf sap caused by rust infection.**—*Canad. J. Bot.*, **38**, 3, pp. 399–407, 6 graphs, 1960. [21 ref.]

Extracts of healthy leaves of Little Club and Khapli wheat and those inoculated

with race 15B of *Puccinia graminis* were made under anaerobic conditions in further studies at Univ. Sask., Saskatoon [**37**, 348]. Oxidation-reduction potentials in the extracts were measured at 2 different levels in the presence and absence of both methylene blue and riboflavin as redox mediators. At the lower level (mediators absent) a reversible rise in potential occurred during infection of Little Club; with Khapli the rise was similar but was not reversed. The response to infection of resistant and susceptible plants was also reflected in characteristic changes in the av. potentials at higher levels (mediators present). After infection the oxidation-reduction balance of susceptible tissue was reorganized by the introduction of new systems which were found in the reduced state only. At this stage the oxidation-reduction potential of resistant tissue was only poorly poised, as indicated by a rise in the av. potentials and as demonstrated by oxidation-reduction titrations. The possibility is considered that a rust-induced catalyst may 'short-circuit' the chain of H transport, thus initiating all the observed redox changes.

Mohamed (H. A.). **Predisposition of Wheat seedlings to stem rust infection and development.** *Phytopathology*, **50**, 5, pp. 339–340, 1 fig., 1960.

In further studies at the Inst. Agric., Univ. Minn., St. Paul [cf. **36**, 390], Lerma 2 wheat seedlings grown at 70° or 85° F. were inoculated with race 139A of *Puccinia graminis* at 65° or 85° and then held for 14 days at 74° or 87°. More infection centres and higher infection types occurred after the higher pre-inoculation temp.

Cotter (R. U.). **Fertilization of pycnia with urediospores and aeciospores in Puccinia graminis.** *Phytopathology*, **50**, 7, pp. 567–568, 1960.

At Inst. Agric., Univ. Minn., St. Paul, it was found that aecidial development in *P. graminis* from wheat and rye could be induced when either uredospores or aecidiospores were mixed with the pycnial nectar or apparently haploid pycnia on potted barberry seedlings. Aecidiospores appeared to be rather more effective (26 aecidia from 86 trials; 20 from 121 with uredospores), and the best results were obtained with spores from the same host source, though some crosses between the two were successful.

Asai (G. N.). **Intra- and inter-regional movement of uredospores of black stem rust in the upper Mississippi river valley.** *Phytopathology*, **50**, 7, pp. 535–541, 1 fig., 2 diag., 3 graphs, 1960.

Further studies by U.S. Army Chem. Corps, Fort Detrick, Frederick, Md [cf. **39**, 296], made use of a series of 24 rotobar samplers, each with a brass rod coated with sticky glycerine jelly [loc. cit.] and revolved by an electric motor for 1 hr. at about 2,500 r.p.m., mounted on a steel ring in the sampling plot. Similar rods, exposed from aircraft in a manner described, made possible the detection of spore showers and the northerly limits of spore travel. In inoculated plots max. production of uredospores of *Puccinia graminis* occurred on wheat at the 'soft-dough' stage, some time before rust infection was at a max., but coincident with a peak production of new pustules, especially on the upper parts of the plant. Downwind spore travel was correlated with wind velocity, time of day, magnitude of spore production, and level of the bulk of the pustules on the plant. No rust spores were found in rain samples, even during spore shower periods.

Allan (R. E.), Vogel (O. A.), & Johnston (C. O.). **Leaf rust resistance of semi-dwarf winter Wheat selections, its inheritance and association with plant height.** —*Agron. J.*, **52**, 7, p. 408, 1960.

Studies by the Crops Res. Div., U.S. Dept Agric., indicated that 5 semi-dwarf wheat selections possessed useful resistance to leaf rust (*Puccinia triticina*) [*P. recondita*: **39**, 467], varying in degree and controlling 2–7 of the 9 races tested.

Inheritance of resistance in crosses of Burt with the semi-dwarf selections 7524 and 7525 under field conditions at Pullman, Washington, could be accounted for by a partially dominant factor in the 1st instance and a recessive factor in the 2nd, but epistasis may be involved in the inheritance of a common factor. Dwarfness appeared to be inherited independently of leaf rust resistance, but in 7525 × Burt tallness was associated with susceptibility.

Schlehuber (A. M.) & Sebesta (E. E.). **Progress in Wheat-Grass breeding.**—*Proc. Okla. Acad. Sci.*, **39**, pp. 6–16, 2 fig., 3 graphs, 1959.

Of the thousands of selections from crosses of the Kansas *Triticum* spp. × *Agropyron elongatum* hybrids [**25**, 158] with wheat vars. at Okla. State Univ., Stillwater, C.I. 13523 is the 1st and only str. in which wheat-like characters, high leaf rust [*Puccinia recondita*: **37**, 274] resistance, high yield, and acceptable (Triumph-like) flour quality have been recombined.

Dalas (V.). **Noi linii de Grîu de toamnă create la staţiunea Tîrgu-Frumos.** [New lines of winter Wheat bred at Tîrgu-Frumos Station.]—*Anal. Inst. Cerc. agron. Român.*, Ser. C, **26** (*1958*), pp. 129–134, 1959. [Russ., Fr. summ.]

Tîrgu-Frumos 1937 G.S. (an *erythrospermum* wheat-rye hybrid) and Tîrgu-Frumos 60 (an *erythrospermum* var. from A15 × Hard Federation) are reported to be as early and as resistant to frost as A15, but more resistant than A15 to brown rust [*Puccinia recondita*] and higher yielding.

Fuchs (Eva). **Physiologische Rassen bei Gelbrost (Puccinia glumarum (Sch.) Erikss. et Henn.) auf Weizen.** [Physiologic races of yellow rust (*P. striiformis*) of Wheat.]—*NachrBl. dtsch. PflSchDienst, Stuttgart*, **12**, 4, pp. 49–63, 1 fig., 1960. [Engl. summ.]

Of the 11 differential wheat vars. in use at the Inst. für Botanik, Brunswick [**35**, 758], 7 (Blé rouge d'Écosse, Webster, Holzapfels Früh, Vilmorin 23, Carsten V, Spaldings Prolific, and Rouge Prolifique barbu) are to varying degrees unsatisfactory.

The races 1x, 2x, 5/6, 7x, 7xV_1, 7/8, 7A, 17 26, 27 53, 54, 55, and x have been identified in recent years [**38**, 737]: in several cases 2 race numbers of the Gassner and Straib index are combined because of the very small differences on the unreliable differentials, and in fact only 1x, 7A, 27/53, and 54 were clearly distinguishable. The races are listed in order of frequency in material submitted from the various European and Asian countries collaborating with the Institute. Certain wheat vars. appear to be carriers of specific races, thus Peko and Heines Kolben carry 54, Capelle carries 2x and 55, and the breeders' line Heine 110, 27 53. Work in the next few years will be concentrated on the selection of physiologically suitable pure lines of the known differentials, and on an attempt to find good new differentials, particularly screening vars. ('Suchsorten').

Kühnel (W.). **Der Einfluß der Faktoren Bodenart, Bodenfeuchtigkeit und Bodentemperatur auf die Pathogenitätsabnahme des Steinbranderregers des Weizens (Tilletia caries DC.) Tul. im Boden.** [The influence of the factors soil type, soil moisture, and soil temperature on the decrease in the pathogenicity of the agent of Wheat bunt (*T. caries*) in the soil.]—*NachrBl. dtsch. PflSchDienst, Berl*, N.F., **14**, 2, pp. 21–26, 3 graphs, 1960. [Engl., Russ. summ.]

Further experiments at the Biologischen Zentralanstalt, Berlin [cf. **39**, 225], indicated that the viability of *T. caries* spores in soil was limited, significant infection from the soil being unlikely to occur after 4 weeks. Overwintered spores never initiated infections. The effect of the 3 soil factors was complex. Loss of viability

was more rapid in light than in heavy soils, but this effect was usually masked by the influence of moisture and temp.

Schaller (C. W.), Holton (C. S.), & Kendrick (E. L.). **Inheritance of the second factor for resistance to bunt, Tilletia caries and T. foetida in the Wheat variety Martin.**—*Agron. J.*, **52**, 5, pp. 280–282, 1 graph, 1960.

The 2 genes in Martin that condition resistance to various bunt races [**39**, 225] were found to be inherited independently. The M(artin) gene conditions resistance to 15 races and is completely dominant to race T-1. M_2, incompletely dominant to race L-9, confers resistance to 5 races. M and M_2 are effective against races T-10 and T-11; their combined coverage adequately explains the resistant reaction of Martin to 18 of the known races. Baart, Onas, and Federation appear to possess the M_2 gene. The evidence suggests that the genes for virulence in the pathogen, with respect to the M, M_2, and H genes of the host, are distributed at random within the 25 races used.

Murav'ev (V. P.). Воспитание растений в направлении повышения устойчивости против болезней. [Plant breeding with the purpose of increasing resistance to diseases.] -In *Omagiu lui T. Săvulescu* [see **39**, 667], pp. 519–528, 1959. [Roman. summ.]

A discussion, with data, from Ukr. Inst. Plant Prot., Kiev, of the influence of nutrition on the resistance of wheat to *Tilletia tritici* [*T. caries*: cf. **38**, 686]. In a 3-yr. trial the yield of healthy ears of Ukrainka, a var. most responsive to fertilizers, was 93-146% of the control, according to the macro- or micro-element applied, and the total yield of ears was increased by 112–140%. In general the best resistance was obtained from dressings with superphosphate with or without K salt [unspecified], both at 400 kg./ha.

Podhradszky (J.). **Zwei physiologische Formen des Weizenzwergsteinbrandes in Ungarn (I).** [Two physiological forms of Wheat dwarf bunt in Hungary (I).]—In *Omagiu lui T. Săvulescu* [see **39**, 667], pp. 601–610, 2 fig., 2 graphs, 1959. [Roman. summ. 27 ref.]

A review from Inst. Plant Prot., Budapest, of the taxonomic history of the *Tilletia* spp. causing dwarf bunt [cf. **35**, 432]. Of 2 forms [of *T. contraversa*] found in Hungary [**39**, 263], distinguished by spores starting to germinate after 20-25 and 28–35 days, respectively, the 1st showed similarities, such as ability to infect some wild *Agropyron* spp., to the N. American, the 2nd to the Turkish forms, in contrast to those found in Germany, Austria, and Switzerland.

Săvulescu (Alice) & Stănescu (Neli). **Contribuții la studiul desvoltării ciupercii Ustilago tritici (Pers). Jens. în planta de Grîu.** [Contribution to the study of the development of *U. nuda* in Wheat plants.]—In *Omagiu lui T. Săvulescu* [see **39**, 667], pp. 669–681, 6 fig., 1959. [Russ., Fr. summ. 21 ref.]

Studies at Inst. agron. Res., Bucharest, on infected Lutescens 62 and Bankut 1201 [cf. **38**, 686] showed that the mycelium in the young plants consists of thin hyphae with inflated haustoria, in the stalk of more mature plants of thin, straight, scantily ramified hyphae formed of long cells, in the nodes of extensively ramified hyphae with short cells, while at the stage of ear formation the hyphae thicken, fuse and form a gelatinous mass, from which chlamydospores are separated. At emergence, tillering, and ear formation a temp. of 5–19° C. favours mycelial growth, whereas > 20° after tillering hampers development in spikes and ears.

Flag smut of Wheat.—*Agric. Gaz. N.S.W.*, **71**, 3, pp. 140–142, 3 fig., 1960.

A description of flag smut of wheat (*Urocystis tritici*) [*U. agropyri*] and control measures [cf. **35**, 173].

Powers (H. R.) & Sando (W. J.). **Genetic control of the host-parasite relationship in Wheat powdery mildew.**—*Phytopathology*, **50**, 6, pp. 454–457, 1960. [13 ref.]

This amplification of studies of *Erysiphe graminis* by the U.S. Dept Agric. already noticed [**36**, 755] gives further details substantiating the designation of the independently inherited dominant genes for virulence of the pathogen as V_t and V_u.

Minz (G.) & Gerechter (Z.). **Maḥalat ha-ergoṭ ba-Ḥiṭṭah.** [Ergot disease on Wheat.]—*Hassadeh*, **38**, 1, pp. 95–97, 3 fig., 1957. [Heb. From author's summ.]

It is reported from Dept Phytopath., agric. exp. Sta., Rehovot, Israel, that *Claviceps purpurea* occurred in 1956 on volunteer rye at Mikve-Israel [**37**, 230], and had also previously been artificially inoculated to rye on the station's fields at Kubeibah. In 1956–7 wheat, especially var. Norsit, was infected at various places throughout Israel, the highest infection being in the Giv'at ha-Sheloshah area. Infection was found in 8 wild grass spp. in the vicinity: *Festuca arundinacea*, *Hordeum bulbosum*, *Lolium* sp., *Oryzopsis miliacea*, *Phalaris brachystachys*, *P. bulbosa*, *P. minor*, and *P. paradoxa*. *F. arundinacea* was comparatively highly infected near the infected wheat field. In shifting sand dunes at Rishon-le-Zion *C. purpurea* was found on *Ammophila arenaria* and *Danthonia forskahlei*. Good cultivation is recommended for control, including deep ploughing (40–50 cm.) of stubble in infected fields, suitable rotation, and clean seed.

Minz (G.), Gerechter (Z.), & Avizohar-Hershenson (Zehara). **Inoculation experiments with ergot on Wheat and wild grasses.**—*Ktavim (Quart. J. agric. Res. Sta. Beit Dagan-Rehovot* [formerly *Rec. agric. Res. Sta. Rehovot*], *Israel*), **10**, 1, pp. 29–32, 3 fig., 1960.

The success reported, except with 1 grass sp., of a series of cross inoculations between wheat and a number of wild grass spp. with spores of *Claviceps purpurea* [see above] confirms the assumption that wild grasses are natural hosts of the pathogen and may act as sources of inoculum in epiphytotic attacks on wheat [cf. **37**, 159].

Agrawal (N. S.), Hodson (A. C.), & Christensen (C. M.). **Development of granary weevils and fungi in columns of Wheat.**

Christensen (C. M.) & Hodson (A. C.). **Idem II.**—*J. econ. Ent.*, **51**, 5, pp. 701–702, 1958; **53**, 3, pp. 375–380, 3 fig., 1960.

At Minn. agric. Exp. Sta., St. Paul, Minn., samples of hard and soft red winter wheat with an 11–12% moisture content were stored in cylinders 6 in. diam. and 36 in. high, inoculated with *Sitophilus granularius* (500), and examined periodically for moisture content, [unspecified] storage moulds, and number of weevils [**37**, 277]. When the insects were introduced at the bottom of the column and not confined, they gradually moved to the top, where they increased, together with the moisture content and mould incidence. When the weevils were confined in wheat of 15·6% moisture content in dacron cloth bags at the bottom of the columns humidity and moulds increased greatly in the wheat in the bags, appreciably in that 6 in. above, and slightly 12 in. above.

In the second series of studies seed-grade, hard red spring wheat with a moisture content of 13–14% was stored in 'transite' cylinders 8 in. diam. and 40 in. high, each containing 23 kg. grain, into which 200 adults of *S. granarius* were introduced and allowed to wander freely. Also 200 weevils were added to 2·4 g. grain in brass cloth cages at the bottom of the cylinders, which were kept at 25° C. and 65–70% R.H. and examined at 2-, 4-, and 6-mon. intervals. Where the insects were not confined, the moisture level reached 20% at the upper levels, while throughout the bulk it increased by several % and there was a substantial rise in the population

of storage moulds, notably *Aspergillus repens* and *A. restrictus*; at the end *Alternaria* sp., present in over 75% of the original kernels, had disappeared entirely. Where the weevils were confined, the moisture content increased by up to 3% in the grain several in. above the infested portion and about 0·5% at a height of 1–2 ft. As in previous studies the grain in the control series remained essentially unaltered.

NEURURER (H.). **Die Lagerfähigkeit von schlämm- und trockengebeiztem Saatgut.** [Storage performance of wet- and dry-treated seed.] —*PflSchBer.*, **24**, 1–2, pp. 1–13, 1 graph, 1960. [Engl. summ.]

Tests at the Bundesanstalt für Pflanzenschutz, Vienna, indicated that wheat seed of moisture content approx. 14%, after slurry or dry treatment [cf. **39**, 225] with Hg products, can be stored for up to 1 yr. without prejudice to germinability. Storage for more than 2 months following treatment with an Hg-lindane product reduced germination, particularly at low temp. in the field. Further work will be done with seed of higher moisture content. The results so far obtained apply also to oats and barley.

World catalogue of genetic stocks, Barley.– 14 pp., F.A.O. publ., 1959. [Engl., Fr., Span. introductions.]

The tabulated data from Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Netherlands, Norway, Sweden and the United Kingdom include resistance to diseases [cf. **39**, 469].

DICKASON (E. A.), RAYMER (W. B.), & FOOTE (W. H.). **Insecticide treatments for aphid control in relation to spread of Barley yellow dwarf virus.**—*Plant Dis. Reptr*, **44**, 7, pp. 501–504, 2 graphs, 1960.

At Ore. State Coll., Corvallis, field treatment of Hannchen barley with systemic and contact insecticides against the vectors (*Macrosiphum dirhodum*, *Rhopalosiphum fitchii*, and *M. granarium* [*M. avenae*]) of barley yellow dwarf virus [**39**, 166, 567] sometimes delayed infection but eventually all the plants became infected.

MALIK (M. M. S.) & BATTS (C. C. V.). **The infection of Barley by loose smut (Ustilago nuda (Jens.) Rostr.). The development of loose smut (Ustilago nuda) in the Barley plant, with observations on spore formation in nature and in culture.** – *Trans. Brit. mycol. Soc.*, **43**, 1, pp. 117–125, 2 pl. (7 fig.), 1 fig.; pp. 126–131, 2 pl. (6 fig.), 3 fig., 1960. [12, 13 ref.]

At Imperial Coll., London, invasion of the barley ovary and embryo by *U. nuda* [cf. **37**, 653] was alike in inoculated and naturally infected seeds. The hyphae penetrate the pericarp and pass via the parenchyma along the testa on the ventral side of the grain and cross the basal endosperm to enter the scutellum, whence they permeate most parts of the embryo, especially the hypocotyl and the growing point. Infection via the style has not been found [cf. **36**, 238]. The mycelium was mainly intracellular in the pericarp and testa, and mainly intercellular in the aleurone, endosperm, scutellum and embryo. Comparison is made with similar infection of wheat [**34**, 361].

As in wheat [cf. **40**, 39], the mycelium in germinating barley seed and in the plant moves with the growing point, permeates the crown node, and is carried up in the young ear by elongation of the stem internodes. In the very young ear large areas are occupied by tangled hyphae, which become aggregated in the florets as the ear develops. Ultimately all parts of the ear except the rachis are replaced by spores produced by fragmentation of the hyphae. The fungus was grown on the media of Sartoris [**4**, 269] and produced spores.

Minz (G.) & Gavrielith-Gelmond (Haia). **Hadbarat ha-paḥmon ha-poreaḥ ha-hum ba-Seʿorah be-shiṭṭah anaerobit.** [An anaerobic method for the control of loose smut of Barley.] —*Hassadeh*, **39**, 6, p. 622, 1959. [Heb.]

In 1957–8 at the agric. Res. Sta., Rehovot, Israel, a modification of T. T. Hebert's anaerobic method [**34**, 590] for the control of barley loose smut [*Ustilago nuda*: **32**, 550] was 100% effective. Glacier seed with over 2% infection was steeped in water kept at room temp. for $3\frac{1}{2}$ hr. and then heated for ca. 50 min.; the seed was then maintained at 29° C. for 41 hr. in sealed containers, the vol. of seed being $\frac{3}{4}$ that of the container, and air dried at 24°. Average germination was 99% and emergence 87%. Seedlings from treated seed were completely free from infection, whereas there was an av. of 40 infected plot (3·8% infection) from untreated seed.

Comes (I.) & Ene (Ileana). **O formă de atac foliar a ciupercii Ustilago nigra Tapke.** [A form of leaf attack by the fungus *U. nigra*.] —In *Omagiu lui T. Săvulescu* [see **39**, 667], pp. 181–185, 3 fig., 1959. [Russ., Fr. summ.]

This rare form of loose smut [cf. **37**, 34] on the leaves and ears of barley is reported from Butoiești, Romania, by Agron. Inst. 'Tudor Vladimirescu', Craiova.

Leyten (R.) & Casier (P. J.). **Enkele aspekten van de meeldauwziekte van de graangewassen.** [Some aspects of the mildew disease of cereals.]—*Agricultura, Louvain*, Sér. 2, **7**, 4, pp. 471–482, 1959. [Fr., Engl., Germ. summ.]

An account of the symptoms, life-cycle, taxonomy, and control of *Erysiphe graminis*, the factors concerned in the development and spread of infection, and the nature of the damage, is followed by a report on analytical investigations by paper-chromatographical methods of the low-sugar percentages in diseased and healthy Herta barley plants (100 of each) on 6 dates after inoculation. The only low sugar detected was sucrose, the content of which was higher in the diseased, corresponding to a lower wt. of dry matter.

Wahl (I.), Dinoor (A.), Halperin (J.), & Schreiter (S.). **The effect of Rhamnus palaestina on the origin and persistence of Oat crown rust races.**—*Phytopathology*, **50**, 7, pp. 562–567, 1960. [34 ref.]

In further studies at the Fac. Agric., Hebrew Univ. Jerusalem, Rehovot, Israel [cf. **38**, 363], 75 aecidial collections of *Puccinia coronata* from *R. palaestina*, obtained in winter and early spring 1956–59, were increased on Fulghum oat seedlings and indexed on standard differential vars. The main races were the 276–264–263 group and 286, 277, and 270, all virulent on Landhafer and Santa Fe, and the 202–203 complex that attacks Bond. In addition, 11 apparently undescribed races were identified. *R. palaestina* evidently plays a major part in the perpetuation of some races of *P. coronata* and the initiation of others. The virtual freedom from rust of some plots of susceptible oats near to infected *R. palaestina* indicates the importance of environmental conditions in the development of epiphytotics.

Hille (M.). **Ein auffälliges Beispiel für die Beeinflussung der Symptome des Haferflugbrandes (Ustilago avenae (Pers.) Rostr.) durch den Wirt (Avena fatua L.).** [A striking example of the influence of the host (*A. fatua*) on the symptoms of loose smut of Oats (*U. avenae*).]—In *Omagiu lui T. Săvulescu* [see **39**, 667], pp. 291–295, 2 fig., 1959. [Roman. summ.]

At the Inst. für Botanik, Brunswick, Germany, differential symptoms were produced on *A. fatua* from Cluj, Romania, and from the Peloponnese, Greece, by the same inoculum of *U. avenae* from infected oats [cf. **38**, 1]; the former displayed the usual ear smut, the latter remained without panicles and carried the infection on tillers and upper leaves.

LINDBERG (G. D.). **Reduction in pathogenicity and toxin production in diseased Helminthosporium victoriae.**—*Phytopathology*, **50**, 6, pp. 457–460, 2 fig., 2 graphs, 1960.

A more detailed account [of *Cochliobolus victoriae*] from La agric. Exp. Sta., Baton Rouge [**39**, 167].

MOREY (D. D.). **Reaction of Rye varieties to leaf rust.**—*Robigo*, *1959*, 9, pp. 2–6, 1959. [Span. translation.]

This information on *Puccinia recondita* has been noticed [**38**, 591].

WAHLROOS (Ö.) & VIRTANEN (A. I.). **Isolation of an anti-Fusarium substance present in intact Rye seedlings.** *Acta chem. scand.*, **13**, 8, pp. 1725–1726, 1959.

Further experiments at the Biochemical Inst., Helsinki, Finland [**38**, 256], resulted in the isolation from rye seedlings of a glucoside $C_{14}H_{17}O_2N$ (m.p. 186–187° C.), which in turn yielded the aglucone $C_8H_7O_4N$ (m.p. 152°) when the seedlings were crushed. The aglucone was converted into benzoxazolinone $C_7H_5O_2N$ under liberation of formic acid. In young wheat and maize plants the corresponding methoxy derivative, the glucoside $C_{15}H_{19}O_{10}N$ (m.p. 168–170°), was detected as an original compound from which the aglucone $C_9H_9O_5N$ (m.p. 156–157°) was enzymatically formed, a reaction product of the latter being 6-methoxybenzoxazolinone $C_8H_7O_3N$. Activity against *Fusarium nivale* [*Calonectria nivalis*] of the glucosides is very weak, whereas the aglucones inhibited growth on oatmeal-glycerol at 0·1% and benzoxazolinone at 0·06.

About half the total activity of the 70% alcohol extract of 3 vars. of rye seedlings was found to reside in the ether-soluble, weakly acidic material and the remainder in the water-soluble. In the latter, part of the active material was extractable with *n*-butanol, but it could not be recovered after attempts at fractionation by paper chromatography or after 2 months in the refrigerator. On the other hand, the ether-soluble, weakly acidic material was shown to contain an active component (R*f*-value 0·86 in *n*-propanol: NH_3 (7:3) on Whatman No. 4 paper). Details are given of the purification of the component, which was ultimately converted into a slightly yellow-green oil, and some of its properties are described. The yield from 255 g. fresh seedling wt. was 68 mg. In further *in vitro* tests the growth of *C. nivalis* was reduced to 50% by 0·5–0·7 mg. ml. of the active substance; 2·4 mg. caused 85% inhibition.

JUGENHEIMER (R. W.). **Hybrid Maize breeding and seed production.**—369+63 pp., 72 fig., 3 diag., 31 graphs, 1 plan, 4 maps, Rome, *F.A.O. agric. Developm. Pap.* 62, 1958. [63 pp. ref. Received Apr. 1960.]

This useful publication contains a chapt. (pp. 168–199) on disease resistance and tolerance, including sections on inoculation techniques, methods of assaying resistance, and notes on 18 diseases of maize.

YAKOVLEVA (Mme N. P.). О методах испытания Кукурузы на устойчивость к пузырчатой головне. [On methods for testing Maize for resistance to blister smut.]—Изв. Тимирязев. сел.-хоз. Акад. [*Izv. Timiryazev. sel.-khoz. Akad.*], *1958*, 6 (25), pp. 31–48, 3 fig., 1958. [Engl. summ.]

In laboratory and field experiments at Dept Agric. Phytopath. and Sta. for Plant Prot. of the Timiryazev agric. Acad. in 1955–58 the vacuum method was the most promising for inoculating maize seedlings with *Ustilago zeae* [*U. maydis*: **39**, 23]. It is independent of season, gives greater infection, and makes it possible to study the disease in the glasshouse and the laboratory throughout the year. Varietal resistance, virulence of different ecotypes of *U. maydis*, the effect of the mineral nutrition on resistance, the role of humidity and temp., and the effects of chemicals

and herbicides on resistance were studied. Whereas under field conditions infection ranged (3 yr. av.) from 27·3% in Voronezhskaya 76 to 8·7% in Partizanka, the percentage of seedlings (3–4 days) infected in the vacuum reached 32·4% in Sterling, but was as low as 7·1% for hybrid Voronezhskaya 76 × Partizanka. In field experiments inoculation with an injector at the stem base of the young plants produced almost 4-fold higher infection than the introduction of the same suspensions at the apex. Whichever method is used, account must be taken of the phase of development: infection at the stem base is most effective at the 6–8 leaf stage but produces scarcely any results at the 12–13 leaf stage. Injection of the cob gave up to 75% infection in Voronezhskaya 76.

Beceriescu (D.), Popescu (I.), Tușa (Corina), & Vasiliu (L.). **Combaterea tăciunelui Porumbului produs de Sorosporium holci-sorghi (Riv.) Moesz și Ustilago zeae (Beckm.) Ung. prin tratamente cu diferite produse fungicide aplicate la semințe.** [Control of smuts on Maize caused by *Sphacelotheca reiliana* and *U. maydis* by seed treatment with different fungicides.] –In *Omagiu lui T. Săvulescu* [see **39**, 667], pp. 43–48, 1959. [Russ., Fr. summ.]

From observations over 3 yr. it is concluded by Inst. agron. Res., Bucharest, that several fungicides [listed] give adequate control of *S. reiliana* [**38**, 203], and some also give partial control of *U. maydis*.

Kingsland (G. C.) & Wernham (C. C.). **Variation in Maize seedling blight symptoms with changes in pathogen species, isolate, and host genotype.**—*Plant Dis. Reptr*, **44**, 7, pp. 496–497, 1960.

At the Penn. agric. Exp. Sta., University Park, an isolate of *Gibberella zeae* [**38**, 740] caused severe blight on both inbred and hybrid lines of maize grown from seed in infested soil in the greenhouse; a 2nd was virulent to the inbreds only. Several isolates of *Fusarium moniliforme* [*G. fujikuroi*] and its var. *subglutinans* from maize were not pathogenic under the experimental conditions.

Philipp (A.). **Untersuchungen an Marasmius sp. an Mais. Ein Beitrag zur Kenntnis der Keimlings- und Fußkrankheiten des Maises.** [Studies on *M.* sp. on Maize. A contribution to the knowledge of the seedling and foot rots of Maize.]—*Kühn-Arch.*, **73**, 1–2, pp. 42–84, 17 fig., 1 graph, 1959. [Russ., Engl., Fr. summ. 69 ref.]

Of the numerous fungi isolated at the Phytopathologisches Inst., Martin-Luther Univ., Halle-Wittenberg, Germany, from diseased maize plants collected mainly near Aschersleben and Bernburg, *Fusarium culmorum*, *Rhizoctonia* [*Corticium*] *solani*, and *Pythium* sp. were pathogenic. The symptoms caused by these spp. are described. *Diplodia zeae* could not be detected.

A *M.* sp. [cf. **17**, 737], probably a form of *M. graminum*, was identified for the 1st time as an agent of root and stalk rot. Fruit bodies developed both in inoculated field plants and on seeds in culture in Neubauer dishes containing quartz sand moistened with distilled water, Czapek-Dox, or Knop's solution and maintained in diffuse light at room temp. The dish containing the Knop was kept for a week in a refrigerator at 4° C., and after 4 months the 1st fruit bodies formed, followed during the next 6 weeks by 30 more. The stipes measured 3–5 cm. and the light red pileus, later turning paler, 4–16 mm. diam.; the gills usually numbered 12–14. The dikaryotic mycelium grew fairly rapidly on various standard media over a wide pH range. The opt. temp. was 28° but colder conditions were tolerated without injury.

In field inoculation experiments the fungus caused heavy damage, the dying seedlings being covered with a dense mat of white mycelium. In surviving plants the mycelium was found at the base, especially between the leaf sheaths, while the

crown roots were also frequently injured and blackened. The host range of the pathogen was wide, particularly heavy damage being sustained by white, blue, and yellow lupins, broad beans, *Panicum miliaceum*, and *Setaria italica*, while other susceptible spp. included barley, rye, wheat, *Lolium perenne*, peas, vetch, red clover, and lucerne.

Leont'eva (Mme Y. A.) & Gerasimov (B. S.). Испытание новых протравителей Кукурузы в борьбе с болезнями и почвенными вредителями. [Testing new treatments for Maize against diseases and soil pests.]—Изв. Куйбышев. сел.-хоз. Инст. [*Izv. Kuibÿshev. sel.-khoz. Inst.*], *1958*, 13, pp. 201–206, 1958.

In lab. and field tests in 1952–56 at Dept Physiol. and Plant Prot. and exp. Farm, Kuĭbÿshev agric. Inst., dusting maize seed with thiram+20% dieldrin or +8% hexachlorane at 2–3 kg./ton or with mercuran at 1 kg./ton gave better control of [unspecified] fungal diseases than granosan+hexachlorane.

Hara (K.). **Ine no byōgai. A monograph of Rice diseases.**—139 pp., 12 pl. (1 col.), 3rd Edition, Tokyo, Kōkodō shoten, 1959. [Jap.]

This revised presentation of the 1st and 2nd editions (1918 and 1939) is limited to fungus diseases. The monograph has 2 parts, the 1st (pp. 9–24) containing a brief history of the study of fungus diseases of rice, a tabular index of symptoms, a sect. on controls and a calendar, and a sect. on chemicals. The 2nd (pp. 25–112) gives mycological descriptions of pathogenic and saprophytic fungi occurring on rice plants and on grain in storage, including the new spp., *Phyllosticta* (*Phoma*) *varacola* Hara and *Sporodesmium oryzaecolum* [*Sporidesmium oryzicola*] Hara. Drawings of 86 spp. are included. There is a general index (pp. 4–8) and an index of Latin names (pp. 116–119).

McMillian (W. W.), McGuire (J. U.), & Lamey (H. A.). **Relationship of hoja blanca to the inoculation point and to the age and yield of Rice plants.**

Atkins (J. G.), Newsom (L. D.), Spink (W. T.), Lindberg (G. D.), Dopson (R. N.), Persons (T. D.), Lauffer (C. H.), & Carlton (R. C.). **Occurrence of hoja blanca and its insect vector, Sogata orizicola Muir, on Rice in Louisiana.**

Galvez (G. E.), Thurston (H. D.), & Jennings (P. R.). **Transmission of hoja blanca of Rice by the planthopper, Sogata cubana.** *Plant Dis. Reptr*, **44**, 6, pp. 387–389; pp. 390–393, 1 map; p. 394, 1960.

At the Res. Lab., Camaguey, Cuba, when *S. orizicola* infected by hoja blanca virus [**39**, 573, 701] were fed on susceptible rice (Nato) 2 weeks–3 months old, white leaf symptoms appeared in 6–34 days. The earliest appearance followed inoculation of the emerging leaf. Within each plant age group, as the vectors fed on progressively older tissues so the length of time increased before symptoms appeared. Early infected plants were more severely injured than later, but all diseased plants suffered yield loss. Susceptible vars. suffered losses in panicle wt. of 22–82%.

The information in the 2nd paper has been noticed [**39**, 573].

At the Rockefeller Foundation Colombian Min. Agric., Palmira, preliminary results indicated that *S. cubana* can transmit hoja blanca from rice to *Echinochloa colonum* [**37**, 163] but not to rice, and from *E. colonum* to *E. colonum* but not to rice.

Beachell (H. M.), Jodon (N. E.), Johnston (T. H.), Thysell (J. R.), Atkins (J. G.), & Lamey (H. A.). **Breeding Rice varieties for resistance to the virus disease hoja blanca.**—*News Lett. int. Rice Comm.*, **8**, 3, pp. 6–9, 1959. [Received June, 1960.]

Breeding work was carried out by the U.S. Dept Agric. in co-operation with the rice experiment stations of Ark., Calif., La, and Texas and with organizations in

Latin America against hoja blanca virus disease [cf. above]. The following minor U.S.A. short- or medium-grain vars. proved resistant: Colusa (C.I. 1600), C.I. 9155, Asahi (8312), Lacrosse (8985), and Arkrose (8310) [**39**, 574]. A high level of resistance was found in many Japonica vars. and in short- and medium-grain vars. with Japonica genes. The resistant C.I. 9416 [loc. cit.] is valuable because of its very early maturity and good grain shape and appearance.

Chattopadhyay (S. B.) & Dickson (J. B.). **Relation of nitrogen to disease development in Rice seedlings infected with Helminthosporium oryzae. Induced mutation and cytological investigations in Helminthosporium oryzae.**—*Phytopathology*, **50**, 6, pp. 434–438, 5 fig.; pp. 439–442, 20 fig., 1960.

Further details are given from Univ. Wis., Madison, of information already noticed [**39**, 170]. When 7 rice vars. were grown on 0·5 N Hoagland either containing only NO_3 N or +3 levels of NH_4NO_3, blight induced by *H. oryzae* [*Cochliobolus miyabeanus*] was max. in seedlings in 105 p.p.m. N as NO_3 only or 329 p.p.m. (as 217 NO_3, 112 NH_4). Intermediate levels, opt. for host development, reduced both blight and lesion size. Beaumont (B 52-2579) proved especially susceptible but the other vars. differed little in reaction, nor did the 3 fungus isolates differ much in pathogenicity.

Kurodani (K.), Yokogi (K.), & Yamamoto (M.). **On the effect of 2,4-dichlorophenoxy acetic acid to the mycelial growth of Hypochnus sasakii Shirai.**—*Forsch. PflKr. Kyoto*, **6**, 4, pp. 132–135, 3 graphs, 1959. [Jap. Abs. from Engl. summ.]

The pathogenicity of *H.* [*Corticium*] *sasakii* [cf. **37**, 161, 719] on rice was increased by spraying with 2,4-D, which also increased the size and number of disease spots, regardless of the time elapsing after application. In culture on a decoction of rice plants sprayed with 5×10^{-2} % 2,4-D the growth of *C. sasakii* was stimulated.

Dasgupta (S. N.) & Narain (A.). **A note on physiologic races of Sphacelotheca sorghi.**—*Curr. Sci.*, **29**, 6, pp. 226–227, 3 fig., 1960.

In Uttar Pradesh 3 physiologic races of *S. sorghi* [**31**, 380; **37**, 204] on sorghum have been detected by the Bot. Dept, Lucknow Univ. The races differed morphologically and physiologically, and were isolated from different vars.: the distinguishing characters of cultures are described.

Diseases of Sorghum and Broom Millet.—*Agric. Gaz. N.S.W.*, **71**, 3, pp. 136–140, 4 fig., 1960.

The following diseases are described: kernel smut (*Sphacelotheca sorghi*); head smut (*S. reiliana*) [**35**, 352], which is usually not serious; 'false smut', caused by the growth of black or dark brown moulds over the grains; spikelet failure in part of the head, possibly associated with a low level of N in the soil; root and stem rots, caused most commonly by *Fusarium* spp.; 'charcoal rot' (*Macrophomina phaseoli*) [loc. cit.]; and 'red stain', a discoloration of the leaves and leaf sheaths, sometimes of unknown cause, sometimes associated with bacterial or fungal pathogens, and damaging in wet weather. As a rule the last is of little economic importance on grain sorghum but may cause considerable damage to Sudan grass.

Grant (T. J.) & Smith (P. F.). **Infectious variegation of Citrus found in Florida.**—*Plant Dis. Reptr*, **44**, 6, pp. 426–429, 2 fig., 1960.

Following severe cold in Fla in winter 1957, 2 grapefruit trees at Cherry Lake were found with crinkled and irregular, white to yellowish blotches on some of the leaves. The symptoms were transmitted by tissue-grafting to other citrus vars., their

expression being stimulated by pruning and defoliation: leaf and veinlet-banding also appeared. The symptoms resembled those described for infectious variegation [**11**, 173; **19**, 85], and are possibly caused by strs. of citrus psorosis virus complex [**37**, 476], perhaps appearing only under conditions of stress.

Fedorinchik (N. S.). Опыт борьбы с инфекционным усыханием (мальсекко) Цитрусовых. [An experiment in the control of infectious desiccation (mal secco) of Citrus.]—Сборн. Раб. Инст. прикл. Зоол. Фитопат. [*Sborn. Rab. Inst. prikl. Zool. Fitopat.*] 5, pp. 140–174, 6 fig., 1 map, 1958. [2 pp. ref.]

Systematic inspections during 1951–55 for *Deuterophoma tracheiphila* [**39**, 310] on collective and State farms of the Batum region, Adzharskaya A.S.S.R., confirmed that early diagnosis resulting from daily inspection of individual plants and the prompt removal of infected root parts were essential to control. The effectiveness of the measures recommended depended on their being strictly and adequately applied.

Nakaidze (I. A.) & Talakvadze (K. B.). Влияние ростовых веществ на восприимчивость лимонных деревьев к мальсекко. [The effect of growth substances on susceptibility of Lemon trees to mal secco.]—Бюлл. Инст. Чая субтроп. Культ. [*Bgull. Inst. Chaya subtrop. Kul't.*], *1958*, 1, pp. 111–114, 2 fig., 1958. [Engl. summ.]

At the All-Union sci. Res. Inst. for Tea and subtrop. Crops, 2,4-D and 2,4-DB at 0·4 and 0·2% killed *Deuterophoma tracheiphila* [cf. above] in pure culture; lower concs. did not. Ethyl alcohol twice diluted was also effective, but not at greater dilutions. The fungus was also killed by 2,4-D lanolin paste applied to an infected lemon shoot section and the disease was localized. This compound is advocated for treating cuts and mechanical injuries to prevent infection.

Cetas (R. C.) & Whidden (R.). **Evaluation of soil fungicides against Fusarium solani isolated from feeder roots of Citrus trees.** *Plant Dis. Reptr*, **44**, 7, pp. 465–469, 1 fig., 1960.

At U.S. Dept Agric., Orlando, Fla, agar disks from sporulating cultures of *F. solani* [**33**, 226] were buried in soil percolation tubes, drenched with test fungicides, and then plated on potato dextrose agar containing 100μg novobiocin/ml. for survival tests. *F. solani* was killed down to various levels by 100 p.p.m. DAC-649 (3,3,4,4,-tetrachlorotetrahydrothiopene-1,1-dioxide) and 22% dithane D-14 and 200 p.p.m. vapam.

Smoot (J. J.), Meckstroth (G. A.), & Melvin (C. F.). **Promising decay inhibitors for postharvest use on Florida Oranges.** *Plant Dis. Reptr*, **44**, 6, pp. 383–386, 1960.

At U.S. Dept Agric., Orlando, Fla, 20 of 124 test compounds reduced commercial postharvest decay caused mainly by *Diplodia natalensis*, *Phomopsis* [*Diaporthe*] *citri*, and *Penicillium digitatum* [**39**, 77] by 75% after 2 weeks at 70° F.: *m*-chloroisopropyl ester of carbanilic acid, hydracrylonitrile carbanilate, and 2-propyn-1-ol carbanilate were more effective than dowicide A + hexamine in further tests.

Castillo (J. Z.) & Parra (J. H.). **Efecto tóxico del cobre en semilleros de Café.** [Toxic effect of copper in Coffee nurseries.] —*Cenicafé*, **10**, 4, pp. 109–117, 1959. [*Biol. Abstr.*, **35**, 13, p. 3178, 1960.]

At the Dentro Nac. Invest. Café, Chinchina, Colombia, disorders in the root growth of coffee seedlings were found to be related to applications of Cu compounds against root rot disease (*Rhizoctonia* sp.).

King (H. E.). **Plant pathology.**—*Progr. Rep. Exp. Stas. Cott. Gr. Corp.* (*Survey of Reports, season 1958–59*), p. 7, 1960.

The discovery that *Lygus vosseleri* can disseminate *Xanthomonas malvacearum* in Uganda [**39**, 581] is of potential importance for areas where *Lygus* is prevalent. From Antigua the suspected association with boll infection of *Nezara viridula* is reported for the 2nd season. There appears to be some connexion between Abyan root rot [**39**, 414] and the amount and salt content of the soil water.

Wiles (A. B.). **Evaluation of Cotton strains and progenies for resistance to Verticillium wilt.**—*Plant Dis. Reptr*, **44**, 6, pp. 419–422, 1 fig., 1960.

At Miss. agric. Exp. Sta., State Coll., the resistance of Upland cotton to *V. albo-atrum* [cf. **33**, 721; **39**, 580] was tested by a seedling inoculation technique [**32**, 312]. Alabama Hybrids 56–4 M, 257–202, and 81–14, resistant to *Fusarium oxysporum* f. *vasinfectum*, were resistant to *V. alboatrum*, though less so in the field as they matured than in the seedling stage. *Gossypium arboreum*, *G. barbadense*, and *G. herbaceum* strs. were highly resistant to *V. alboatrum* in greenhouse and field tests but not strs. of *G. harknessii* and *G. klotzchianum*.

Fulton (N. D.), Bollenbacher (Katharina), & Moore (B. J.). **A chlorosis of Cotton seedlings caused by Alternaria sp.**—Abs. in *Phytopathology*, **50**, 8 (1), p. 575, 1960.

A chlorosis of the cotyledons of cotton seedlings [in Ark.] was shown to be caused by toxin produced by *Alternaria* sp.; symptoms appeared when seedlings were grown in sterile sand or soil mixed with inoculum, or with autoclaved inoculum or sterile culture filtrate. All vars. of cotton tested were equally susceptible and low light and temp. did not affect the condition, except in retarding plant growth and thus prolonging it.

Sinclair (J. B.). **Reaction of Rhizoctonia solani isolates to certain chemicals.**—*Plant Dis. Reptr*, **44**, 7, pp. 474–477, 1 fig., 1960.

In greenhouse and laboratory studies at La agric. Exp. Sta., Baton Rouge, 5 isolates of *R.* [*Corticium*] *solani* from diseased cotton seedlings [**38**, 600; **39**, 173] differed statistically in their sensitivity to pentachloronitrobenzene, captan, and dichlone, separately and in combination. This may account for the apparent lack of uniformity of results of field tests of these fungicides for the control of damping-off.

Wiles (A. B.) & Presley (J. T.). **Seed deterioration as a factor in nub-root production in Cotton.**—*Plant Dis. Reptr*, **44**, 7, pp. 472–473, 2 fig., 1960.

At Miss. agric. Exp. Sta., State College, during screening for disease reaction [**38**, 43], at least 50% of the seedlings from some seed samples germinated in sterile sand emerged late and the primary radicles were lacking or severely injured so that the plants developed without tap roots [**34**, 149]. The lateral roots and hypocotyls were healthy. Similar results were obtained with seed deteriorated artificially in the laboratory by manipulating temp. and moisture.

Flor (H. H.). **The inheritance of X-ray-induced mutations to virulence in a urediospore culture of races of Melampsora lini.**—*Phytopathology*, **50**, 8 (1), pp. 603–605, 1960.

In further studies in N. Dakota [**39**, 582] 2 such mutations of race 1 to virulence [cf. **38**, 694] in Koto flax were selfed; race 1 is heterozygous for avirulence in Koto. As each of the 198 selfed cultures was virulent the mutations were heritable; 16 were also virulent in Abyssinian and Leona, vars. in relation to which race 1 is homozygous for avirulence. New genomes for virulence were therefore induced by

X-irradiation, the mutations being attributable to the deletion of part of the chromosome containing the closely linked genes for avirulence in the 3 vars. Virulence is apparently conditioned by absence of the dominant avirulence.

TRIONE (E. J.). **Extracellular enzyme and toxin production by Fusarium oxysporum f. lini. The HCN content of Flax in relation to Flax wilt resistance.**—*Phytopathology*, **50**, 7, pp. 480–482, 1 graph; pp. 482–486, 4 graphs, 1960.

At Dept Agron., Univ. Calif., Davis, *F. lini* [cf. **37**, 664] produced abundant polygalacturonase and cellulase and very little pectinmethylasterase in a synthetic, liquid medium. Fusaric acid, produced *in vitro* and on wilt-susceptible (but not resistant) tissue, induced severe wilt in both resistant and susceptible flax cuttings.

The presence in flax tissue of HCN as a cyanogenic β-glucoside, linamarin, was studied to test the hypothesis that production of a β-glucosidase by *F. lini*, as has been observed in other fusarial wilts [cf. **33**, 123], might release sufficient HCN to inhibit the pathogen. The relevant literature is reviewed and the chemical and other procedures used are described in detail. Young flax tissue grown under controlled conditions was rich in linamarin-bound cyanide, which decreased as the plant aged and increased with higher light intensity. Young shoots may contain > 2,000 p.p.m. bound HCN, but in culture growth of *F. lini* is strongly inhibited by 135 p.p.m., suggesting that linamarin is not uniformly distributed. High cyanide content of healthy flax vars. had no uniform correlation with resistance to either of 2 clones of the pathogen used.

COLHOUN (J.). **Physiologic specialization in Polyspora lini Laff.**—*Trans. Brit. mycol. Soc.*, **43**, 1, pp. 150–154, 1960.

At the Plant Path. Div., Min. Agric., Queen's Univ., Belfast, variability in *P. lini* [**39**, 471] was demonstrated but as none of the flax vars. tested (Blenda, Herkules, Norfolk Earl, Norfolk Queen) over 4 yr. was immune to one race of *P. lini* and susceptible to another in the stem-break phase the races were separated on the basis of the level of attack on the differentials. After culturing on artificial media for more than 1 yr. most isolates lost some of their pathogenicity, probably because of saltation. Cases of contrasts in immunity and susceptibility found within a var., even when this constituted a single plant culture, suggested heterozygosity for resistance in the seed sample used.

PRASAD (N.), MATHUR (R. L.), & AGNIHOTRI (J. P.). **Cercospora abelmoschi-cannabini (Sawada) Prasad, Mathur, and Agni. comb. nov. causing leaf spot disease of Ambari Hemp (Hibiscus cannabinus Linn.) in Rajasthan.** —*Sci. & Cult.*, **25**, 10, pp. 600–601, 1 fig., 1960.

Ambari hemp cultivated extensively for its fibre as a border crop from July to Oct. is reported by the Dept Agric., Rajasthan, to suffer from a severe *C.* leaf spot. The fungus differs from *C. hibiscina* [cf. **39**, 108] and *C. abelmoschi* in having shorter and non-septate conidiophores in compact fascicles and in its host specificity. It closely resembles *C. hibisci-cannabini*. Its pathogenicity was ascertained by inoculation of pot plants with pure cultures.

KLEMENT (Z.) & KASZONYI (S.). **A Kender új baktériumos betegsége.** [A new bacterial disease of Hemp.] —*Növénytermelés*, **9**, 2, pp. 153–158, 5 fig., 1960. [Russ., Engl. summ.]

Pathological and biochemical tests by Res. Inst. for Plant Prot., Budapest, indicate *Pseudomonas cannabina* [cf. **39**, 313] as the pathogen. Its incidence in the part of Hungary bordering on Yugoslavia is associated with its occurrence in Banat [**38**, 408]. However, the strs. isolated in Hungary differed from the Yugoslavian in their alkalization of litmus milk without coagulation and peptonization and by no acid from raffinose.

Lavits'ka (Mme Z. G.). Паразитні гриби, що виявлені в 1953–1954 рр. в зелених насадженнях міст півдня України. [Parasitic fungi noted in 1953–4 in green plantations in towns of the Southern Ukraine.]—Вісн. Київськ. Унів. [*Visn. Kyyivs'k. Univ.*], Ser. biol., **1**, 1, pp. 27–33, 1958. [Russ. summ. Abs. in *Referat. Zh. Biol., 1960*, 11, p. 200, 1960.]

At Genichesk, Lugansk, Zhdanov, Osipenko, Tsuryupinsk, and Kherson, the parasitic fungi determined on ornamentals were 2 Phycomycetes, 17 powdery mildews, 17 rusts, and 28 fungi imperfecti. Powdery mildew was noted on 68 rose vars. There were first records for the Ukraine of conidial powdery mildew [*Oidium* sp.] on *Dahlia variabilis*, *Pyrethrum* [*Chrysanthemum*] *parthenium*, and *Bellis perennis*.

Pag (H.). **Untersuchungen über das 'Gerbera-Sterben'.** [Investigations on 'death of *Gerbera*'.]—*NachrBl. dtsch PflSchDienst, Stuttgart*, **12**, 5, pp. 74–77, 6 fig., 1960. [Engl. summ.]

Cultivation of the ornamental *G. jamesonii* in Germany is limited by a fatal wilt disease [cf. **31**, 555; **35**, 813], hitherto ascribed by German authors to *Rhizoctonia violacea* [*Helicobasidium purpureum*] (Gleisberg, *Süddtsch. Erwerbsgärtn.*, **5**, pp. 450–451, 1951; Hahn, *Gartenwelt*, **58**, pp. 393–394, 1958). Affected plants become limp overnight, and the leaves, from a faded green, sometimes take on a reddish tinge and roll up a little at the edges, finally drying brown and brittle. The base of the shoot turns dark and rots, so that the plant breaks if an attempt is made to pull it out by the roots. The roots themselves appear relatively healthy at first; later they mostly become watery brown, but the central cylinder remains firm.

At the Laboratorium für Zierpflanzenkrankheiten, Berlin-Dahlem, *Phytophthora cryptogea* was isolated from diseased plants by inserting tissue fragments into surface sterilized ripe apples incubated at 25° C. for 5 days. Inoculation of healthy *Gerbera* reproduced the symptoms and the fungus was reisolated.

Brierly (P.) & Smith (F. F.). **Transmission of Tobacco ringspot virus on tools during harvesting flowers and corms of Gladiolus.**—*Plant Dis. Reptr*, **44**, 7, pp. 463–464, 1960.

Previous findings at the U.S. Dept Agric., Beltsville, Md, indicating that tobacco ringspot virus is transmitted from gladiolus to gladiolus by *Myzus persicae* [**34**, 723] are thought to be erroneous and due to contamination of the test clones during cultivation. The virus was transmitted on cutting tools used in harvesting flowers (1·8% when healthy and infected plants were cut alternately) and in removing tops before harvesting corms (10% and 1·9% in 2 tests). The virus was symptomless in these gladiolus cultivars and seedlings and was detected by indexing on *Antirrhinum*.

Bald (J. G.) & Solberg (R. A.). **Antagonism and synergism among organisms associated with scale tip rot of Lilies.**—*Phytopathology*, **50**, 8 (1), pp. 615–620, 5 fig., 1960.

At Univ. Calif., Los Angeles, *Pseudomonas* sp. was isolated in association with *Cylindrocarpon radicicola* and *Fusarium oxysporum* from scale tip rot lesions on Croft lily bulbs [cf. **26**, 398; **39**, 110]. On wound inoculation the bacterium caused lesions on the bulb scales, but the fungi produced only very minor damage. The results of inoculations with different combinations of the bacteria and fungi from the scales, and also with dilutions of inocula are described in detail. In general, *C. radicicola* proved antagonistic to the *Pseudomonas* and reduced or eliminated the lesions, whereas when the bacterium acted synergistically with *F. oxysporum* the lesions were extended. These observations throw light on anomalous results of pesticidal treatment of bulbs and soil.

Burnett (H. C.) & McFarlin (J. R.). **Cercospora bunchosiae, a new leafspot disease of Barbados Cherry.**—*Plant Dis. Reptr*, **44**, 7, p. 505, 1960.

C. bunchosiae was found on *Malpighia glabra* at Miami, Fla, in Dec. 1959 causing slightly sunken, round spots, dark brown with a grey centre and a yellow halo, 2–10 mm. diam.

Schmelzer (K.). **Untersuchungen über das Ring-mosaik-Virus der Kapuzinerkresse.** [Investigations of the ring mosaic virus of Nasturtium.]—*Z. PflKrankh.*, **67**, 4, pp. 193–210, 36 fig., 1960. [Engl. summ.]

The virus described has, for about 10 yr., caused varying levels of infection in *Tropaeolum majus* growing near the Inst. für Phytopathologie, Aschersleben, Germany. It infected 65 of 125 plant spp. inoculated by abrasion and was systemic in all except 3: 19 fam. were represented, particularly Solanaceae, Hydrophyllaceae, and Chenopodiaceae. A characteristic symptom was a mottling consisting of ring spots or arcs, commonly disappearing after a time.

Myzus persicae and *Macrosiphum solanifolii* [*M. euphorbiae*] were effective vectors, and *Acyrthosiphon onobrychis* [*A. pisum*] less effective. *Cuscuta* spp. did not transmit the virus alone but sometimes did so when a str. of cucumber mosaic virus causing local necrotic lesions and tip necrosis was also present. Seed transmission was not observed.

Physical characteristics varied according to the test plant. The thermal inactivation point was 66–68° C., the dilution end point beyond 1×10^{-4}, and longevity in expressed sap up to 11 days (8 days in dried leaves).

Nasturtium ring mosaic is the name proposed for the disease; the virus is considered to be identical with the *Tropaeolum* ring spot virus described by Smith [**29**, 198]. Symptoms on broad bean were identical with those of broad bean true mosaic virus [broad bean mottle virus] but the viruses differed in most other properties.

Sandu-Ville (C.), Lazăr (A.), & Hatmanu (M.). **Ciuperci noi, parazite și saprofite pe gramineele și leguminoasele furajere din Moldova.** [New parasitic and saprophytic fungi on grass and leguminous fodders in Moldavia.] *Lucr. științ., Iași, 1959*, pp. 171–194, 25 fig., 1959. [Russ., Fr. summ.; 15 ref.]

A list from agron. Inst., Iași, of 29 spp. new to Romania and 161 new host records.

Kask (K.). **Kõrreliste heintaimede haigustest Tartu ja Jõgeva rajoonis 1956 a.** [On diseases of forage grasses discovered in the Tartu and Jõgeva districts in 1956.] *Eesti Põllumaj., 1959*, 1, pp. 61–65, 1959. [Russ. summ. Abs. in *Referat. Zh. Biol., 1960*, 12, p. 205, 1960.]

In a study at the Estonian agric. Acad. of 7 grasses 35 diseases were found, of which 7 (*Mastigosporium album* most frequent) were on dew grass [*Dactylis glomerata*], 6 on timothy [*Phleum pratense*], and 5 on fescue [*Festuca*].

Sill (W. H.) & Desai (M. K.). **Additional characteristics of Panicum mosaic virus.**—*Plant Dis. Reptr*, **44**, 7, p. 487, 1960.

Further studies at Kans. State Univ., Manhattan, established that *Panicum* mosaic virus [**37**, 50] is not seed-borne in either *P. virgatum* or *Digitaria sanguinalis*. The virus survived storage in desiccated *P. virgatum* leaves in a refrigerator at 2–4° C. for 2 yr. *Setaria lutescens* was found by inoculation to be a new host.

Wadsworth (D. F.) & Young (H. C.). **Spring dead spot of Bermudagrass.**—*Plant Dis. Reptr*, **44**, 7, pp. 516–518, 2 fig., 1960.

This disease, which has become prevalent on *Cynodon dactylon* turf since 1954, occurs as well-defined, circular, dead areas from a few in. to 4 ft. in diam. in the

early spring when the grass begins to grow. The var. U-3 is the most severely affected; others are African, Common, Tiffine, and Tifgreen. Several *Helminthosporium* spp. have been isolated from the dead patches but the disease was not reproduced in any inoculation experiments.

Couch (H. B.) & Moore (L. D.). **Broad spectrum fungicides tested for control of melting-out of Kentucky Bluegrass and Sclerotinia dollar spot of Seaside Bentgrass.**—*Plant Dis. Reptr*, **44**, 7, pp. 506–509, 1960.

In field trials at Pa State Univ., University Park, the best control of *Helminthosporium vagans* on *Poa pratensis* [**39**, 588] was afforded by dyrene, Upjohn GAB-5, and California spray ML-373. *S. homoeocarpa* on *Agrostis* spp. [**39**, 177] was reduced from 75% to an av. of 25% (plot surface blighted) within 8 days of the 1st application of tersan OM, Upjohn GAB-5, actidione RZ, California spray ML-372 and ML-373, and dyrene.

Freeman (T. E.). **Effects of temperature on cottony blight of Ryegrass.**—Abs. in *Phytopathology*, **50**, 8 (1), p. 575, 1960.

Infection by *Pythium aphanidermatum* in Fla [cf. **39**, 76] is negligible below 20° C. but damage can follow even a short spell of temp. favouring the disease and some occurred in inoculated grass [*Lolium* sp.] exposed to 25° for only 2 hr. on 3 successive days. Increase in temp. and/or length of exposure increased the blight; 50% of max. damage occurred after 8–24 hr. at 25°, 4–8 hr. at 30°, and 2–4 hr. at 35°.

Bloom (J. R.) & Couch (H. B.). **Influence of environment on diseases of turfgrasses. I. Effect of nutrition, pH, and soil moisture on Rhizoctonia brown patch.**—*Phytopathology*, **50**, 7, pp. 532–535, 4 graphs, 1960.

A more detailed account from Dept Bot. Plant Path., Pa State Univ., University Park, of *R.* [*Corticium*] *solani* on *Agrostis palustris* [**37**, 591].

Nicolson (T. H.). **Mycorrhiza in the Gramineae. II. Development in different habitats, particularly sand dunes.**—*Trans. Brit. mycol. Soc.*, **43**, 1, pp. 132–145, 1 pl. (2 fig.), 1 map, 1960. [31 ref.]

Vesicular-arbuscular mycorrhiza have been found to be widespread in the Gramineae, and in further studies at Univ. Nottingham [**39**, 459], using massed, stained root segments on slides and a mechanical stage and an ocular graticule, the incidence of [unspecified] endophytes and external mycelium was estimated and differences noted between spp., habitats, and communities. In a sand-dune at Gibraltar Point, Lincs. and in dune systems at Southport (Lancs.) and St. Cyrus (Kincards.) endophyte incidence varied according to the colonization zone of the dune and with plant succession [cf. **38**, 465]. Possible origins of infections in the pioneer, embryo-dune phase were examined. Incidence in sand-dune grasses was affected by the spp., degree of stability of the habitat, quantity and kind of organic matter in the sand, and microbiological activity. Development of mycorrhiza may influence the role of grasses in the dune succession. Much external mycelium and numerous penetrations (necessary for food transference) have been noted only in samples from the fixed yellow dunes, where the association may benefit the host.

Estey (R. H.). **Sclerotinia trifoliorum and winter killing of Red Clover.**—*Rep. Quebec Soc. Prot. Pl.*, **41** (*1959*), pp. 83–86, 1960.

A comparative study at Macdonald Coll., Quebec, showed that Dollard red clover plants of the leafy, rosette type suffered a higher percentage of infection by *S. trifoliorum* [cf. **34**, 460], possibly because they offer a larger leaf surface to airborne spores in the autumn, than the non-rosette, late-flowering type, which however, is less winter hardy.

Sackston (W. E.). **Verticillium albo-atrum on Red Clover (Trifolium pratense).**—*Rep. Quebec Soc. Prot. Pl.*, **41** (*1959*), pp. 116–120, 1960.

Verticillium wilt [cf. **39**, 324, 426] was first noticed in spaced plantings of red clover at Macdonald Coll., Quebec, in 1938–40, but never in farm fields in adjacent areas or in other localities of E. Canada [**22**, 323]. The fungus was often recovered from dead plants, on which it sporulated freely at soil level. When inoculated directly into stems or used to infect soil in greenhouse experiments, it was pathogenic to both seedlings and mature plants; spraying the leaves with a spore suspension killed seedlings incubated in moist chambers for 10 days. Filtrates from liquid cultures caused wilting and death of cut shoots.

Fulton (N. D.) & Hanson (E. W.). **Studies on root rots of Red Clover in Wisconsin.**—*Phytopathology*, **50**, 7, pp. 541–550, 2 fig., 1960. [23 ref.]

These further studies at Univ. Wis., Madison [cf. **34**, 155; **39**, 232] begin with a review of the literature on clover failure. Fungus isolates tested against Wisconsin Mildew Resistant red clover in sand and in soil (steamed, fumigated, or natural) were reduced on the basis of pathogenicity from 49 to 10—3 each of *Fusarium oxysporum* and *F. solani* and 1 each of *F. roseum* [**39**, 716], *F. moniliforme* [*Gibberella fujikuroi*], *Gliocladium roseum*, and *Rhizoctonia* sp. These generally proved more pathogenic to seedlings than to older plants and showed a wide range of virulence. Unclipped plants not infected as seedlings had only a trace of root rot after 5 months, though dry-weight tests indicated some stunting. Clipping at 3-day intervals to remove all leaves and petioles immediately above the crown weakened the plants and increased susceptibility to root rots, the effect depending on the rate of growth, influenced in turn by temp., light, and environment in general. Older plants (12 weeks) were more affected by clipping than younger (8 weeks). Disease development tended to increase at higher temps. (28° C.). Addition of the isolates to naturally infested field soil had little effect on disease severity in unclipped plants, whereas with clipped and weakened plants there was sometimes an increase or a decrease, according to the soil type and the isolate.

Williams (W. A.), Harwood (L. H.), & Hills (F. J.). **Incompatibility of seed treatment fungicides and seed-applied Legume inoculum observed on field-grown Subterranean Clover.** *Agron. J.*, **52**, 6, pp. 363–365, 1960.

At the Agron. Dept, Univ. Calif., Davis, treatment of subterranean clover seed with phygon XL, spergon SL, vancide 51, arasan SFX, cerenox, and captan caused reduction in forage yield when *Rhizobium trifolii* [cf. **34**, 11] inoculum was applied by the moist method immediately before planting. It is concluded that where inoculation is necessary, e.g. in the greater part of the area of adaptation of subterranean clover in Calif., the seed should be inoculated but not treated with a fungicide until one which is non-toxic to *R. trifolii* is available: where fungicidal treatment is known to be necessary to control seedling disease [cf. **39**, 421], a procedure such as 'preplanting' inoculum, diluted with wheat middlings or sawdust, is justified.

Frosheiser (F. I.). **A method for screening Alfalfa plants for resistance to Pseudopeziza medicaginis.**—*Phytopathology*, **50**, 7, p. 568, 1960.

At Inst. Agric., Univ. Minn., St. Paul, an improved method of inoculating lucerne plants in the greenhouse with *P. medicaginis* [**39**, 323] was developed. Lucerne leaves bearing apothecia were fastened inside Petri dish covers over water agar and the discharged ascospores were used to inoculate oatmeal slants. After 4 weeks the slants were comminuted with water and poured (1 ml.) over oatmeal agar plates, subsequently incubated at 20° C. In 3–4 weeks ascospores were being discharged and the plates were inverted for 48 hr. over lucerne plants in a moist

chamber. The best results were obtained when 1 to several trifoliate leaves were present, lesions appearing within 14–20 days in plants removed to the greenhouse at 21°. Reaction was assessed by type of lesion and extent of chlorosis.

MALLACH (N.). **Viruskrankheiten in Baumschulen. Ergebnisse der 1959 in Bayern durchgeführten Baumschulkontrollen.** [Virus diseases in nurseries. Results of nursery inspections in Bavaria in 1959.]—*Pflanzenschutz*, **11**, 12, pp. 174, 176, 1959.

Following new regulations in 1959, recognition of a nursery by the Bund deutscher Baumschulen now necessitates inspection for virus diseases. Those to be looked for in each of 5 groups of trees (apple, pear and quince, sweet cherry, sour cherry, and plum, peach, and apricot) are specified [cf. **37**, 87] and the results of inspections over the year are tabulated.

GILMER (R. M.) & BRASE (K. D.). **Relative infection potentials of rootstock and scion in increasing virus incidence in the fruit nursery.**—*Proc. Amer. Soc. hort. Sci.*, **75**, pp. 188–194, 1 graph, 1960.

This mathematical analysis from N.Y. State agric. Exp. Sta., Geneva, suggests that in commercial fruit nurseries the use of virus-infected rootstocks leads to greater virus incidence than virus-infected scions, and sometimes also to the formation of virus complexes. The use of infected scions does not increase virus incidence over the level established by the 1st propagation, and when rootstocks are virus-free, complexes are not formed.

1960 spray recommendations for tree fruits in eastern Washington.—*Ext. Bull. St. Coll. Wash.* 419, 36 pp., 1960.

The 1960 edition on the usual lines [cf. **37**, 666].

VUKOVITS (G.). **Erkennung und Verhütung von Nährstoffmangelkrankheiten im Obstbau.** [Recognition and prevention of nutrient deficiency diseases in fruit growing.]—*Pflanzenarzt*, **13**, 6, pp. 54–58, 6 fig., 1960.

A popular note on the diagnosis and correction of K, Mg, Fe, and B deficiencies.

SOENEN (A.) & AERTS (R.). **Importance des traitements précoces contre la tavelure.** [Importance of early treatments against scab.]—*Agricultura, Louvain*, Sér. 2, **8**, 2, pp. 339–351, 1960. [Flem., Engl. summ. (4 lines)]

A tabulated survey is given of spraying experiments against scab [*Venturia inaequalis*] in orchards in the St. Trond and Waremme districts of Belgium during 1958 on apple vars. Golden Delicious and Beauty of Boskoop, using captan and pomasol forte. The results demonstrated the serious consequences of the omission of 2 or 3 pre-floral treatments, which reduced the yield by 20 and 15%, respectively, in the 2 trials, corresponding to a loss of 3,000–4,000 kg./ha., equivalent to a min. of Fr. 15,000.

BURGAUD (L.) & DESAYMARD (P.). **Efficacité du zirame et du thirame sur les tavelures du Poirier et du Pommier.** [Effectiveness of ziram and thiram against scab of Pear and Apple.]—*Phytoma*, **10**, 97, pp. 12–16, 1958.

The tabulated data presented are the results of trials of ziram, thiram, zineb, and captan, and occasionally S against scab on apple trees [*Venturia inaequalis*] in the Paris region and on pear [*V. pirina*] in the Lyons region during 1953–57 [cf. **37**, 288]. In those trials for which control data are given the outstanding results were: ziram (175 g./hl.) on apple in 1953, with an efficiency coefficient (based on leaf spotting) of 87·8, compared with 91 for captan at 125 g.; and 'micronized' ziram (210 g./hl.) on apple in 1955, with a coefficient of 97·6, compared with 95·1 for captan at 125 g.

Porreye (W.). **Kanker op Appel en Peer.** [Canker on Apple and Pear.] —*Agricultura, Louvain*, Sér. 2, **8**, 1, pp. 43–50, 1960.

Two forms of infection by *Nectria galligena* have been found in Belgium, one on 1-yr.-old wood and usually killing the twigs, and the other on wood of 2 or more yr. which serves as a perpetual source of infective material [cf. **39**, 422]. Experiments demonstrated the importance of the scars left after leaf drop (the critical moment for fungicidal treatments) as points of infection. Ascospore flights occur principally during the spring and autumn, rain being essential for their liberation; in 1958 the 1st ripe perithecia were found at the beginning of Oct., followed a month later by abundant ascospore discharges and a temporary outburst of massive conidial formation induced by high R.H.

Hardenburg (R. E.) & Anderson (R. E.). **Further evaluation of diphenylamine for the control of Apple scald.** *Proc. Amer. Soc. hort. Sci.*, **75**, pp. 47–52, 1960.

In further studies at the U.S. Dept Agric., Beltsville, Md, apple scald [**36**, 768] in the vars. Stayman, Rome Beauty, Delicious, Grimes Golden, and York Imperial was reduced from 64% (untreated) to 6% using DPA wraps (1·5 mg.), 7% with DPA + oil wraps and with DPA dip (1,000 p.p.m.), and 8% with DPA spray (1,000 p.p.m.), compared with 35% scald with mineral oil wraps.

Slight injury was caused to less than 1% of the fruit by DPA, which had no adverse effect on fruit quality.

Fernandez (C. E.) & Childers (N. F.). **Molybdenum deficiency in Apple.**—*Proc. Amer. Soc. hort. Sci.*, **75**, pp. 32–38, 2 fig., 1960.

In nutrient culture at Rutgers Univ., New Brunswick, N.J., Rome Beauty apple seedlings suffering from Mo deficiency [cf. **36**, 194] exhibited a general stunting with uniform chlorosis of the young leaves, and scorching of the tips and then the margins of older leaves, which later curled downwards. The older leaves showed a high N accumulation. The addition of 0·01 p.p.m. Mo to the nutrient solution corrected the deficiency symptoms in the younger parts of the seedlings.

Small amounts of Mo were determined by bio-assay using *Aspergillus niger*. In N.J. orchards the peak Mo conc. in normal leaves was 0·19 p.p.m. in July. Leaves in culture with 0·05 p.p.m. exhibited deficiency symptoms. Leaves with this av. and below were found in 2 counties.

Stapp (C.). **Der 'Feuerbrand' der Obstgehölze — Gefahr seiner Einschleppung nach Deutschland.** ['Fireblight' of fruit trees—danger of its introduction into Germany.] —*NachrBl. dtsch. PflSchDienst, Stuttgart*, **12**, 3, pp. 33–37, 4 fig., 1960.

This note comprises a description of the disease on pome fruits and the causal bacterium, *Erwinia amylovora* [**38**, 60; **39**, 596], and calls for particularly close inspection of imported material in order to prevent its introduction into Germany [map 2].

Lamb (R. C.). **Resistance to fire blight of Pear varieties.**—*Proc. Amer. Soc. hort. Sci.*, **75**, pp. 85–88, 1960.

At N.Y. State agric. Exp. Sta. the reaction of 51 pear vars. to *Erwinia amylovora* [**37**, 359] was established, using the av. length of infected shoots killed over 4 seasons' inoculations. Only one commercially important var., Waite, was fairly resistant.

Woodbridge (C. G.) & Lasheen (A. M.). **The nutrient status of normal and decline Bartlett Pear trees in the Yakima Valley in Washington.**—*Proc. Amer. Soc. hort. Sci.*, **75**, pp. 93–99, 1 graph, 1960.

The N content of leaves [cf. **38**, 756] tested at State Coll., Pullman, was significantly

lower than in healthy leaves, probably owing to the lack of fibrous roots on affected trees. No significant differences in the content of 8 other elements were obtained.

Ogawa (J. M.) & English (H.). Relative pathogenicity of two brown rot fungi, Sclerotinia laxa and Sclerotinia fructicola, on twigs and blossoms. - *Phytopathology*. 50. 7. pp. 550–558. 1 fig., 1 graph. 1960. [30 ref.]

At Dept Plant Path., Univ. Calif., Davis, isolates of *S. laxa* and *S. fructicola* on several stone fruit vars. varied markedly in seasonal conditions, those of the former being the longer and length being correlated with air temp. (shortest from summer inoculations, longest spring and autumn). Cankering in inoculated areas was related to initial activity rather than to host resistance. Cankers were largest on almond (*S. laxa* 114 mm. and *S. fructicola* 71 mm. on Drake after 7 days) and decreased in order on apricot, peach and nectarine. *S. fructicola* caused rather more blossom blight than *S. laxa*. Closed flowers were less susceptible to inoculation than open and the stigma of 36 197 was the most susceptible point, though inoculations inside the floral tube initiated almost as much infection.

Peach and almond flowers were notably less susceptible to field infection before opening, plum and apricot equally so both before and after. Leachates from floral parts, especially stigmas, anthers, or the inside of floral tubes, increased spore germination, and pollen-laden floral parts were more prone to infection by other pathogens (cf. 38, 16). For field inoculations dry spores or mycelium applied to stigmas rather than to other floral parts resulted in the best infection, spores being better than mycelium.

Wagnon (H. K.), Bruton (J. E.), Williams (H. E.) & Shoemaker (D. V.). Observations on the natural spread of the so-called Peach stunt virus in a California Peach orchard. - *Plant Dis. Reptr.*, 44. 7. pp. 455–461. 1 fig. 1960.

In 1952 Fahey peaches in an orchard in San Joaquin County were found to be infected by peach stunt virus (38, 344; 39, 181). By 1959 the disease had spread and also affected Johnson, Lilbee and Tuscan. The most conspicuous symptom is dwarfing of the twigs, the small, dark green leaves being arranged in rosettes because of the shortened internodes. In advanced infections trees bloom prematurely and some of the terminal growth dies. The pattern of natural spread suggests that a vector is involved.

Smith (M. A.). Etiology of sour pit of Peaches.—*Appl. Microbiol.*, 8. 5. pp. 290–291. 9 fig., 1960.

At the Market Quality Res. Div., U.S. Dept Agric., Chicago, Ill., *Torulopsis inconspicua* was found to cause sour pit of canning peaches. The yeast is carried by fruit flies (*Drosophila*) and is able to attack only through wounds in the peach surface.

Smith (W. L.) & M'Clung (T. T.). Rhizopus rot of Peaches as affected by post-harvest temperature and moisture.—*Phytopathology*, 50. 7. pp. 515–516. 1960.

In further studies at Belleville (cf. 39, 182) the virulence of *R. stolonifer* spores was not impaired by exposing them to 32° or 40° F. for 3 days, and spores from fruit so held caused rot, subsequently when transferred to freshly wounded fruit at 70°. Inoculated peaches kept for 1 day at 32° or 40°, or continuously at 70°, developed more rot than those kept 3 or 5 days at the low temps. and then transferred to 70°. Moisture continuous at inoculation had more effect than previous holding temp. on decay development at 70°. Packaging methods that allow wounds to dry are therefore best.

CIGGARONE (A.). **A antracnose maculada da Amendoeira (Prunus amygdalus Batch.), causada por Sphaceloma siculum n.sp.** [Spot anthracnose of Almond induced by *S. siculum* sp.n.] — *Arq. Inst. biol., S. Paulo*, **26**, 2, pp. 11–16, 1 pl. (5 fig.), 1959. [Received July 1960.]

S. siculum Ciccarone, which is described (conidiophores 1–2 separate 12–16 × 3–5 μ; conidia 3–6·5 × 1·2–3 μ), is reported from Univ. Bari, Italy. It induces spots, usually not perforated, on leaves and twigs. It is rather common in Sicily and is sometimes the dominant leaf parasite of almond.

FOLLMER (G.) & RAABE (R.). **Verwandtschaftsbeziehungen zwischen Ringfleckenviren von Kulturkirschen und krautigen Pflanzen.** [The relationship between ring spot viruses of the cultivated Cherry and herbaceous plants.] — *Naturwissenschaften*, **46**, 12, p. 403, 1959.

At the Inst. für Virusforsch., Braunschweig, Germany, 2 isolates of cherry Pfeffinger virus (cherry rasp-leaf virus cf. **38**, 530; **39**, 601) from the Bassland and Neckar regions in tobacco sap diluted with physiological saline showed a serological affinity with the European viruses of bean ring spot, potato bouquet, potato pseudo-aucuba (all strs. of tobacco ring spot virus; **36**, 356), *Lathyrus pernom* ring spot, and tomato black ring, but not with the N. American tobacco ring spot virus. Premunity tests gave results in agreement with the above.

An isolate of cherry Stubbenberg virus (? peach ring spot str., **39**, 601) from the Harzvorland, causing ring spot symptoms on cucumber and tobacco, was also examined, though no premunity tests were made. Such small differences as there were between this and the Pfeffinger isolate could be attributed to differences in conc. in the tobacco leaves and were not taken to indicate any serological distinction.

KUHN (E. J.) & PARKER (K. G.). **Yields of Sour Cherry affected by ring spot and yellows viruses.** — *Phytopathology*, **50**, 6, pp. 412–415, 1 diag., 1960.

A study by Dept. Plant Path., Cornell Univ., Ithaca, N.Y., during 1945–53 of a Montmorency orchard on Mazzard rootstock planted in 1940 showed that peach ring spot virus (**39**, 479) spread comparatively rapidly, and irregularly, generally in advance of cherry (sour) yellows virus (**28**, 178), which also had an irregular distributive pattern; the spread of the former indicated a readily mobile vector of the latter, a possible local source of inoculum. Ring spot lowered yield in the 1st yr., but 1–2 yr. later had little effect. Trees with yellows showed a reduction in yield, and had smaller terminals and larger fruit. Trunk circumference increase and total-solids content of the fruit were not affected by the viruses.

MILBRATH (J. A.). **The epinasty virus reaction of Kwanzan and Shiro-fugen flowering Cherry.** — *Phytopathology*, **50**, 7, pp. 495–497, 2 fig., 1960.

At Ore. State Coll., Corvallis, field selection, mechanical transmission, and heat therapy showed the virus causing an epinasty reaction in these vars. to be [cherry] green ring mottle and not [peach] ring spot virus (**37**, 727; cf. **39**, 330).

GILMER (R. M.) & WAY (R. D.). **Pollen transmission of necrotic ringspot and Prune dwarf viruses in Sour Cherry.** — *Phytopathology*, **50**, 7, pp. 524–525, 1960.

Further experiments at N.Y. State agric. Exp. Sta., Geneva (cf. **38**, 217), in which thorough indexing demonstrated the absence of both viruses from the female parents and also virus transmission by nematodes or arthropods was precluded by germinating the seed in peat moss and indexing immediately afterwards, proved conclusively that [peach] necrotic ring spot virus and prune dwarf virus were transmitted by pollen from infected Montmorency to seed produced on healthy English Morello.

Fulton (J. P.). **Strawberry virus dissemination in Arkansas.**—*Phytopathology*, **50**, 7, pp. 477–480, 1960.

Indexing by Univ. Ark, Fayetteville, of commercial Blakemore strawberry plantings on an East Malling clone of *Fragaria vesca* showed that most contained various mixtures of viruses (strawberry mottle, veinbanding [**39**, 725], crinkle, and latent A and C [strawberry latent virus strs.: **37**, 97]). Only strawberry mottle and veinbanding appeared to spread regularly to groups of indicators placed in infected plantings, and to nearby healthy plots. Mottle spread from Apr. to the end of Nov., but in general the rate of spread and build up were slower than had been anticipated. The original stock of Blakemore introduced in 1931 would appear to have been virus-free and largely to have remained so.

Schöniger (G.). **Anatomisch-entwicklungsgeschichtliche Untersuchungen an nekrosevirus-infizierter Fragaria vesca L.** [Anatomical -developmental studies on *F. vesca* infected by necrosis virus.] -*Phytopath. Z.*, **38**, 3, pp. 250–273, 6 fig., 1960. [Engl. summ.]

On the basis of anatomical changes in *F. vesca* (East Malling clone) investigated at the Inst. für Angewandte Botanik, Wurzburg Univ., Germany [cf. **38**. 20: **39**, 603], strawberry necrosis virus is characterized as a virus producing primary symptoms mainly in the tissues between assimilatory areas and the conducting strands. Primary changes in the bundle sheaths and pith of shoots are without detectable influence on the externally visible development of the disease. Poor growth, repression of side shoots, and total necrosis are to be regarded as derived characters conditioned by environment.

Carver (R. G.) & Horn (N. L.). **Summer killing of Strawberry plants caused by Colletotrichum fragariae.**—Abs. in *Phytopathology*, **50**, 8 (1), p. 575, 1960.

Death of strawberry plants in La, in beds in the summer and in the field in late spring at temps. of 80° F. or more, was caused by *C. fragariae* [**15**, 781], which attacked petioles, runners, and crowns. Headliner was the most resistant var. Of soil treatments tried, methyl bromide was the most effective.

Powelson (R. L.). **Initiation of Strawberry fruit rot caused by Botrytis cinerea.**—*Phytopathology*, **50**, 7, pp. 491–494, 7 fig., 1 graph, 1960. [15 ref.]

Most of the information from this study at Ore. State Coll., Corvallis, has been noticed [**39**, 430]. The rot is mainly initiated in senescent floral tissues and direct infection of ripe fruit by air-borne spores is of little importance. Good field control on Marshall was given by 3 preharvest applications of captan (3 lb. 80% wettable powder/100 gal./acre in one test, 35 lb. 7½% dust in another).

Richter (B.). **Ein Beitrag zur Bekämpfung des Grauschimmels (Botrytis cinerea Pers.) an Erdbeeren.** [A contribution to the control of grey mould (*B. cinerea*) on Strawberry.]—*Pflanzenschutz*, **12**, 1, pp. 9–11, 1 fig., 1960.

In spray trials in 1959 at Forchheim by the Bayerische Landesanstalt für Pflanzenbau und Pflanzenschutz, against *B. cinerea* on the highly susceptible strawberry var. Senga Sengana, 0·2% pomarsol forte at 1,000 l./ha. was best, but no spray schedule alone was really satisfactory [**39**, 430]. The author recommends that spraying should be supported by suitable manuring and strict sanitary measures. *B. cinerea* caused losses of up to 80% in the German Federal Republic in 1958.

Klein (H. H.). **Control of Cercospora leaf spot of Bananas with applications of oil sprays based on the disease cycle.**—*Phytopathology*, **50**, 7, pp. 488–490, 1 col. pl., 1960.

This report from the United Fruit Co. Lab., La Lima, Honduras, defines the

successive leaf symptoms of *C. musae* [*Mycosphaerella musicola*: cf. **39**, 726 *et passim*] as yellow streaks, brown streaks, and spots and illustrates 12 stages of development in colour. Application of Texaco 522 oil prevented the development of yellow streaks into spots, but this effect lasted only 24 hr.; the oil did not prevent yellow streaks from appearing, nor arrest development of brown streaks. Best results are therefore obtained by application when yellow streaks are at a max. Adequate control was secured by treatment of field plots by helicopter when 50% of the 1st or 2nd open leaves had a min. of 50 'advanced yellow streaks' or 50% of the 3rd- or 4th-youngest open leaves bore a min. of 100. In 30,000 acres of bananas yellow streaks averaged 0–2,000 leaf on 2nd–4th-youngest leaves, and when the number was high it was found necessary to increase the rate from 0·8 to 1·0–1·5 gal./acre.

Wilson (E. M.). **Physiology of an isolate of Fusarium oxysporum f. cubense.**—*Phytopathology*, **50**, 8 (1), pp. 607–612, 4 graphs, 1960. [19 ref.]

This study [cf. **39**, 726] at the Central Res. Lab., United Fruit Co., Norwood, Mass., showed the number of microconidia and chlamydospores to vary with the level of C and N and the method of culture. Low C, as sucrose, favoured chlamydospore formation in standing and shaken liquid media, but with agar this was favoured by high N. Microconidia formation was favoured by high C in agar media. Exposure of young mycelia to UV light increased production of macroconidia. Numbers of microconidia rose as O conc. increased from 0·01 to 15% in an atmosphere of N. On return to normal atmosphere colonies developed under low O conc. formed macroconidia earlier than those held at higher O. On rhizome tissue of Gros Michel banana there was abundant fungal growth at 2·5 or 1% O in a N atmosphere and less discoloration of the cut surface and deeper decay than at higher O concs. O uptake by microconidia was greater than by macroconidia or chlamydospores; the 2 latter germinated within 5 hr. in Warburg flasks at 29·7° C., but microconidia only after 9–14 hr. The more microconidia unit vol. medium, the lower the percentage germination and increase in spore vol. In distilled water microconidia germinated (after apparently doubling in size) only when at low concs., macroconidia and chlamydospores did so at high. An exocellular oligosaccharide (R_F 0·05) was synthesized from a synthetic medium with a sucrose C source. All the spore forms survived −62° and chlamydospores, but not conidia, survived lyophilization from the frozen state (pre-frozen at −62°).

Meredith (D. S.). **Studies on Gloeosporium musarum Cke & Massee causing storage rots of Jamaican Bananas. I. Anthracnose and its chemical control.** *-Ann. appl. Biol.*, **48**, 2, pp. 279–290, 1 pl., 1960. [22 ref.]

This is a more detailed account of a disease responsible in recent years for major losses in shipments of Lacatan bananas from Jamaica [**39**, 433]. Whereas latent infection [**37**, 175] is responsible for little damage, the fungus readily infects small scratches on the skin, and if these were inoculated, lenticular lesions appeared after 8–10 days' storage at 55° F. Such infection is called 'non-latent anthracnose'.

In several experiments nystatin (mycostatin) [cf. **38**, 124], used as a post-inoculation fruit-dip at 200 and 400 p.p.m., gave good control of wound infection by *G. musarum*. The percentage control was inversely related to the duration of the period between inoculation and treatment, little or no control resulting when this period exceeded 30 hr. Actidione proved too phytotoxic for use against banana fruit rots.

Shmueli (E.). **Chilling and frost damage in Banana leaves.**—*Bull. Res. Coun. Israel*, Sect. D, **8**, 3–4, pp. 225–238, 7 fig. (4 col.), 1 graph, 1960.

At the Agric. Res. Sta., Rehovoth-Beit Dagan, damage occurred in banana leaves subjected for only 10–15 min. to −1·5 to −2° C. and was first evident as yellowing

and watery spots. Chilling of mature leaves from fruit-bearing plants led to accelerated senescence and early death but leaves from suckers sometimes recovered.

Singh (L. B.). **The Mango. Botany, cultivation, and utilization.** —xiii + 438 pp., 54 pl. (3 col.), 72 fig., 4 graphs, 1 map, London, Leonard Hill (Books) Ltd; New York, Interscience Publishers, Inc., 1960. 84*s*. [26 pp. ref.]

In the 16 chapt. of this work, intended for the use of scientists, students, and orchardists, the author presents in a comprehensive form information dealing with every aspect of mango cultivation [cf. **33**, 542; **37**, 98]. Chapt. 12 (pp. 266–291) deals with diseases and their control and is divided into sects. on diseases of the fruit (5), leaf and twig (9), trunk (3), storage diseases, including cold-storage rots and chilling injury, and miscellaneous infections causing minor losses.

Das-Gupta (S. N.) & Sen (C.). **Studies in the diseases on Mangifera indica. XI. The effect of boron on Mango necrosis.** —*Phytopathology*, **50**, 6, pp. 431–433, 1960. [26 ref.]

Further details from Univ. Lucknow of information already noticed [**38**, 219]. Borax at 6 and 8 lb./100 gal. water very significantly reduced necrosis; apparently with a greater intensity of the disease a higher rate is necessary. The necrosis is considered to arise from a disturbance of B metabolism induced by the interaction of some constituent of brick kiln fumes with cell metabolites of mango leaves and fruit.

Zattler (F.). **Bericht über die Welke-, Nematoden- und Virusforschung im Hopfenbau in den Jahren 1958 and 1959.** [Report on wilt, nematode, and virus diseases of Hops in the years 1958 and 1959.]—*Prakt. Bl. PflBau*, **54**, 5, pp. 157–161, 1959.

This popular paper includes brief reference to *Verticillium alboatrum* [**39**, 607], covering its biology, control, and German resistant vars.

In some hop gardens in the Hallertau region in 1959 there were outbreaks of a virus disease, 'Kräuselkrankheit', apparently identical with that reported from the Tettnang region [**37**, 732] and similar to, but not identical with, hop nettle head virus disease [cf. **39**, 482]. Future work on this disease at the Hopfenversuchsgut Hüll will be particularly concerned with transmission, incubation period, and possible nutritional factors [cf. **36**, 553].

Berry (S. L.). **Determination of levels of Verticillium wilt resistance in Mint.**—Abs. in *Phytopathology*, **50**, 8 (1), p. 569, 1960.

Reaction of peppermint, *Mentha spicata*, peppermint × *M. crispa*, and *M. crispa* (in order of increasing resistance) to *V. alboatrum* in Ind. [**38**, 219] was best determined by transplanting inoculated, rooted cuttings to infested muck soil at 20 or 25° C. Resistant clones recovered from initial symptoms, rapidity of recovery indicating the degree of resistance.

Thomas (C. A.). **Relations of variety, temperature, and seed immaturity to pre-emergence damping-off of Castorbean.**—*Phytopathology*, **50**, 6, pp. 473–474, 1960.

At Beltsville, Md, isolations from seed of *Ricinus communis* showed *Pythium* spp., mainly *P. ultimum*, to be responsible for pregermination rotting. Max. loss in moist composted soil was at 10° C. for most inbred vars., but 20° for Cimarron, Illinois 224 A, and Baker 43 and 195. Hybrid stands were poorer at 10° and 20° than at 15° or 30°. Eventual stands from seed from different sets of racemes, and thus of different maturity, were markedly varied. Immaturity appears to be the chief factor predisposing the seed to damping-off. Use of a 'cold test' or seed permeability measurements [cf. **37**, 722] is recommended.

Zadina (I.). Селекция Картофеля на устойчивость к болезням и вредителям. [Potato selection for resistance to diseases and pests.]—Меж. сел.-хоз. Ж. [*Mezh. sel.-khoz. Zh.*], **3**, 6, pp. 81–91, 3 graphs, 1959.

At the sci. Res. Inst. for Potato, Czechoslovak Acad. agric. Sci., 550 vars. of the world collection and 140 wild spp. were tested against biotypes of disease fungi and viruses. Yara and Ambra are recently developed early vars. resistant to *Synchytrium endobioticum* [**39**, 615]: Yara matures somewhat earlier than the susceptible Erstling and both are also more resistant to virus infections. In field tests with 60 vars. for resistance to *S. endobioticum* Yara, Dépêche, Gromadskie, and Taborka produced resistant progeny when selfed. In systematic tests since 1951, 11 vars. were resistant to the prevalent biotype of *Phytophthora infestans* [**33**, 622]. Progeny from selfing Érika hybrid were 82·9% resistant and Akvila 82·6%; 2 of the progeny from reciprocal crosses of the resistant Akvila × Kameraz were 84·1% resistant, Sandnudel · Érika 81·6%, and Akvila × Érika 79·5%. The collection was subjected to lab., field, and provocative field tests to determine resistance to *Actinomyces* [*Streptomyces*] *scabies* [**29**, 639], the best vars. for selection being Hindenburg, Karnea, and Jubel [**39**, 490]. The av. infection coefficient in reciprocal crosses of resistant vars. was Karnea · Hindenburg 15·6, Karnea × Jubel 21. Resistant Czechoslovak vars. were Kardinal and Kotnov. Jubel was the var. with highest resistance to *Spongospora subterranea* [**30**, 71], while the most resistant wild groups were Acaulia (66·6% all spp. resistant), Tuberosa (66·6), and Commersoniana (46·4). Of 195 vars. 109 were hypersensitive to virus X. The progeny of Universal and Borka (selfed) included 76·1 and 71·5% healthy plants, respectively. Among wild potatoes only some spp. of *Solanum acaule* were resistant.

Choudhuri (H. C.). **Spread of rugose mosaic and leaf roll in different varieties of Potatoes in the plains of West Bengal.** *Amer. Potato J.*, **37**, 5, pp. 173–175, 1960.

In 1954 clean, mountain-raised seed of 40 potato vars. was planted at the State agric. Coll. exp. Farm., Calcutta, where aphid infestation is severe during the growing season (*Ibid.*, **34**, pp. 10–19, 1957). Crops were stored at 36° F. and R.H. 85–95%, and provided seed annually (1955–58). In the 1st 2 yr. there were no visible symptoms of leaf roll or rugose mosaic [potato virus Y + ?X: **38**, 614], but in subsequent years there were progressive increases in the level of infection. The tabulated results indicate a wide variation in susceptibility.

Nagaich (B. B.). **Simultaneous transmission of wound-tumour and Potato yellow dwarf viruses by Agallia constricta Van Duzee.**—*Sci. & Cult.*, **25**, 10, 591–592, 1960.

At I.A.R.I., Flowerdale, Simla, India, some nymphs of *A. constricta* were fed for 2 weeks on crimson clover infected by wound tumour [clover big vein virus: cf. **23**, 490] and others on crimson clover infected by potato yellow dwarf virus [loc. cit.]. By subsequently feeding some nymphs of each group on healthy plants and some on the other virus source it was established that simultaneous transmission of the 2 viruses was effected.

Bojňanský (V.), Šmálik (M.), & Kosljarová (Mme V.). **Über die Höhe der durch das Stolburvirus verursachten quantitativen und qualitativen Kartoffelverluste.** [Concerning the level of quantitative and qualitative losses in Potatoes from stolbur virus.]—*NachrBl. dtsch. PflSchDienst., Berl.*, N.F., **14**, 3, pp. 49–54, 1960. [Russ., Engl. summ.]

Most of this information from Czechoslovakia has been noticed [**39**, 611]. When healthy, mountain-raised 'seed' is planted the loss caused by [tomato] stolbur virus in the 1st yr. is approx. 9 dz./ha., compared with approx. 21 dz. with seed from the southern regions.

Savage (E. J.) & Gallegly (M. E.). **Problems with germination of oospores of Phytophthora infestans.**—Abs. in *Phytopathology*, **50**, 8 (1), p. 573, 1960.

Germination of oospores produced in paired cultures [**39**, 491] occurred in horse dung infusion, potato soil leachate, 2,4-D, gallic acid, 3-indolepropionic acid, caffeine, and plates of germinating potato and tomato seeds, and was highest (12·5%) in coumarin. Two oospores submerged in water at 10° C. germinated after 9 months. With 2,4-D followed by UV irradiation for 30 sec.–32 min. germination averaged 3·5% (1 plate, 12·5%); the max. with UV alone was 6%. A germ tube was always produced, with or without a terminal sporangium. Two cultures derived from oospores from pairing a Mexican isolate of race 1,2,4 (A_2) and a Puerto Rican isolate of race 3 (A_1) were of race 1,2 (A_1), indicating genetic recombination.

Wenzl (H.). **Zur Auswahl der Spritzmittel gegen Pilzkrankheiten im Kartoffelbau.** [On the choice of spray chemicals against fungus diseases in Potato cultivation.]—*Pflanzenarzt*, **13**, 4, pp. 35–36, 1960.

This popular note from the Bundesanstalt für Pflanzenschutz, Vienna, briefly discusses factors to be considered in choosing a suitable spray against *Phytophthora infestans*, viz. the presence or absence of *Alternaria* [*solani*]; varietal susceptibility to *P. infestans*; rainfall; date of spraying; and the possible occurrence of mineral deficiencies which may respond to certain of the fungicides.

Hutchison (F. W.). **Pathological Division.**—*Rep. Rubb. Res. Inst. Malaya, 1958*, pp. 48–56, [1960].

This report [cf. **39**, 190] gives preliminary results which indicate that reproducible infections of rubber by pure cultures of *Fomes lignosus* may now be obtained which will permit studies of variations in pathogenicity and resistance. In a test with over 60 chemicals *F. lignosus* displayed noteworthy tolerance of a wide range of compounds. No collar fungicide tested completely prevented the superficial growth of the fungus from reaching the collar. Determinations of the growth rates of isolates at 2 pH levels indicated that different strs. occur in the field. Evidence of the importance of spore infection in the spread of root disease was obtained; incidence is greatly reduced by the application of creosote or other similar preservative to the cut surfaces of tree stumps.

In tests against bird's eye spot [*Helminthosporium heveae*] the best control was again given by mercurized Cu oxychloride applied weekly with a motorized knapsack low-vol. sprayer.

Franco (E.). **A helminthosporiose da Cana de Azucar em Sergipe.** [Helminthosporiosis of Sugar Cane in Sergipe.]—*Publ. Inst. Pesqu. agron., Pernambuco*, 9, 21 pp., 5 pl., 1959. [Engl. summ.]

A report of infection of an unidentified sugarcane var., at Santa Clara Mill, Capele, Sergipe State, Brazil, by *H. stenospilum*, accompanied by *Alternaria tenuis*. Cultivation of the var. is to be discontinued.

Bald (J. G.) & Goodchild (D. J.). **Tobacco mosaic virus in Nicotiana glauca.**—*Phytopathology*, **50**, 7, pp. 497–499, 2 fig., 1960. [14 ref.]

Isolates of tobacco mosaic virus (TMV) from *N. glauca* at Univ. Calif., Los Angeles, were identified by host reactions as a form of the U5 str. [cf. **34**, 110]. Viruses of the U2–U5 type occur in *N. glauca* throughout southern Calif. and are similar to the TMV isolates from that host in other regions of the N. hemisphere. Host reactions and biophysical properties are markedly different from those of TMV in tobacco.

Koelle (G.). **Versuche zur Vererbung der Krankheitsresistenz bei Tabak. 4. Mitteilung : Rippenbräunebefall auf verschiedenen Stellen des Feldes im Sommer 1958 unter genetischem Gesichtspunkt.** [Experiments on the inheritance

of disease resistance in Tobacco. Note 4: vein-browning infection in different areas of the field in the summer of 1958 from the genetic standpoint.]—*Tabak-Forschung, 1959*, 27, pp. 101–107, 2 fig., 1 diag., 1 graph, 1959.

This is a tabulated report of trials at the Bundesanstalt für Tabakforschung, Forchheim-bei-Karlsruhe, Germany. Both the reputedly resistant vars. (Geudertheimer, Havanna IIc [**39**, 243, 737], and Virginia A mutants) and the susceptible Virginia A were more severely infected by vein-browning [potato virus Y str.] on areas given light applications of N and heavy ones of P than on those where the ratios were reversed, indicating that resistance is not an absolute quantity but a genotypically rooted difference in reaction to the virus.

Antagonism between potato virus Y and stem rot (sclerotium infection) [? *Sclerotinia sclerotiorum*: **36**, 619] was manifested by a reduction in the counts of sclerotia with an increase in the virus level. Infection developed first in the earliest-planted plots, thereby demonstrating the importance of the stage of growth as a predisposing factor.

Kröber (H.) & Bode (O.). **Über die 1959 erstmalig in Deutschland aufgetretene Peronospora-Krankheit des Tabaks.** [Concerning the *Peronospora* disease of Tobacco, which occurred in 1959 for the 1st time in Germany.]—*NachrBl. dtsch. PflSchDienst, Stuttgart*, **12**, 2, pp. 17–22, 4 fig., 1960. [Engl. summ.]

P. tabacina [map 23] 1st appeared in the Oldenburg region in late July, and subsequently established itself in other tobacco areas. All commercial vars. were affected. The fungus, the disease, and control measures are briefly described.

Klinkowski (M.) & Schmiedeknecht (M.). **Der falsche Mehltau des Tabaks' Peronospora tabacina Adam, eine für Deutschland bisher unbekannte Tabakkrankheit.** [False mildew of Tobacco, *P. tabacina*, a Tobacco disease hitherto unknown in Germany.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F., **14**, 4, pp. 61–74, 2 pl., 2 graphs, 1 map, 1960. [Russ., Engl. summ. Numerous ref.]

In view of the 1st appearance of this important pathogen in Germany in 1959 [see above] a detailed account of the disease is given. Spraying or dusting with thiocarbamates is the recommended control.

Murakishi (H. H.). **Comparative incidence of graywall and internal browning of Tomato and sources of resistance.**—*Phytopathology*, **50**, 6, pp. 408–412, 1960. [20 ref.]

Studies at Mich. State Univ., E. Lansing, already noticed in part [**39**, 194], showed that grey wall (GW) [cf. **39**, 76] and internal browning (IB), which occurred together in the field in 1958, causing severe losses, have nearly identical symptoms. GW, the cause of which is still unknown, was induced by low light intensity in plants free from tobacco mosaic virus (TMV). Late infection with a TMV str. caused IB. Indian River and Manalucie, resistant to GW, were susceptible to IB, but Holmes' and Walter's TMV-resistant breeding lines [**36**, 282] resisted both GW and IB, and IB reaction was shown to be correlated to TMV reaction. A line resistant to tobacco etch virus, however, was susceptible to IB.

[Similar information also appears in *Quart. Bull. Mich. agric. Exp. Sta.*, **42**, 4, pp. 728–732, 1960.]

Wilson (J. B.) & Gallegly (M. E.). **Nutrition and environment in relation to development of late blight on resistant and susceptible varieties of Tomatoes.**—Abs. in *Phytopathology*, **50**, 8 (1), p. 574, 1960.

In studies with 1 var. susceptible to *Phytophthora infestans*, 2 multigenic resistant, and 2 dominant-gene resistant, susceptibility increased as balanced nutrient conc. rose from 0·1 H[oagland] to 3 H. The multigenic vars. were resistant at 0·1 H.

One of them (19) was resistant at low N with unbalanced nutrient but this resistance broke down under low light after inoculation with tomato race 0. Both multigenic vars. were resistant under high light after inoculation with race 1. Post-inoculation low light always increased susceptibility. Var. 19 resisted race 1 under long day length; its resistance to race 0 broke down at 16° C. but was maintained at 24°. Only dominant gene var. 36 proved resistant to race 1 under a post inoculation temp. of 24°, regardless of pre-inoculation temp. Resistance of all vars. increased with age from 7 to 39 days after transplanting.

HACK (JUDITH) & WILLIAMS (P. H.). **The effect of certain soil treatments on Didymella stem-rot of Tomatoes. II. Laboratory investigations.**—*Ann. appl. Biol.*, **48**, 2, pp. 236–244, 1 graph, 1960. [21 ref.]

In further studies at Glasshouse Crops Res. Inst., Littlehampton, on *D. lycopersici* [**36**, 735; **39**, 260] lab. experiments showed that about 93% of the spores were destroyed after 4 weeks' incubation in unsterilized soil. Sterilized soil did not become toxic to *D. lycopersici* upon the addition of various soil micro-organisms, even after 9 months' incubation, but the addition of unsterilized soil or of a suspension of it rapidly restored toxicity. Direct observations of spores of *D. lycopersici* in soil on slides showed that their fate varied with the treatment of the soil before inoculation; with fresh or air-dry soil moistened at least 2 days before inoculation, lysis of the spores occurred, while with air-dry soil moistened and inoculated simultaneously, some spores germinated but growth of the germ-tubes quickly ceased. There appeared to be no direct connexion between the fate of the spores and soil micro-organisms. The addition of glucose to unsterilized soil reduced its toxicity to *D. lycopersici*. Soils steamed for 1 min. or more were not toxic, but soils steamed for very short periods were as toxic as unsterilized soils, though the soil microflora was greatly reduced. The possible nature of the unknown biological agents which destroy the spores of *D. lycopersici* in unsterilized soils is briefly discussed.

KNIGHT (DOROTHY E.) & KEYWORTH (W. G.). **Didymella stem-rot of outdoor Tomatoes. I. Studies on sources of infection and their elimination. II. Studies on chemical control.**—*Ann. appl. Biol.*, **48**, 2, pp. 245–258; 259–269, 1960. [30 ref.]

In the 1st paper, studies at Nat. Veg. Res. Sta., Wellesbourne, Warwick, are described which showed that *D. lycopersici* [**38**, 562] penetrates the seeds in affected fruits without destroying their viability. Infection of mature plants from infected seed could not be demonstrated. When seed with 80% infection was steeped for 1 hr. in 0·001% ethyl mercuric phosphate, 0·25% panogen, 0·66% aretan, or was treated *in vitro* with 0·01% phenyl mercuric nitrate, or 0·003% phenyl mercuric urea, the fungus was killed though germination was unaffected.

Evidence was obtained that the disease can be introduced into a crop on contaminated canes, in potting soil, and on debris from the previous season's crop. Though the fungus may survive on potato and *Solanum nigrum* no potentially dangerous alternate host was found. Spread was favoured by overhead irrigation. One line of *Lycopersicon hirsutum* (D 69) was highly resistant and another (D 82) highly susceptible to stem and root infection.

In the 2nd paper, laboratory and field tests in 1954–57 on fungicidal control are described. Two methods were used, in both of which the plants were infected experimentally at varying periods before and after treatment with the fungicides. In one, the inoculum was applied to leaf scars and in the other to the stem bases, the fungicides being sprayed on to the same sites. Of the materials tested, maneb was the most successful, exerting eradicant as well as protectant properties at 1 and 2%, but sometimes caused severe phytotoxicity under glass.

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AUTHORS' NAMES

Aerts, 54
Agnihotri, 49
Agrawal, 40
Allan, 37
Anderson, 55
Apple, 16
Asai, 37
Atkins, 45
Avizohar-Hershenson, 40
Bakosh, 20
Bald, 50, 62
Basile, 36
Bates, 8
Batts, 41
Baxter, 30
Beachell, 45
Becerescu, 44
Beck, 26
Beraha, 26
Bercks, 57
Berezovaya, 13
Berry, 60
Billing, 15
Bloom, 52
Boalch, 23
Bode, 63
Bojňanský, 61
Bollenbacher, 48
Bordash, 20
Borsdorf, 22
Boullard, 24
Brase, 54
Braun, 15
Breece, 56
Brierly, 50
Bucur, 15
Budd, 15
Bulloch, 13
Burgaud, 54
Burnett, 51
Carlton, 45
Carr, 6
Carver, 58
Casler, 42
Castillo, 47
Cejp, 28
Cenóz, 35
Cetas, 47
Chatterji, 16
Chattopadhyay, 46
Childers, 55
Choudhuri, 36, 61
Christensen, 40
Ciccarone, 57
Ciferri, 29
Clutter, 20
Colhoun, 49
Comes, 42
Cotter, 37
Couch, 52
Creelman, 1.
Crossan, 25
Dalas, 38
Darby, 17
Das Gupta, 46, 60
Desai, 51
Desaymard, 54
Deysson, 17
Dickason, 41
Dickson, 46
Diercks, 24
Dilks, 20
Dimond, 12
Dinoor, 42
Dishon, 19
Domsch, 19
Dopson, 45
Drachovská, 12, 30
Dunin, 7, 13, 23
Ellis, 29
Ene, 42
English, 56
Estey, 52
Fedorinchik, 47
Ferenczy, 18
Fernandez, 55
Flor, 48
Follman, 57
Foote, 41
Franco, 62
Franco Do Amaral, 14
Frear, 16
Freeman, 52
Fries, 25
Frindt, 20
Frosheiser, 53
Fuchs, 38
Fujisawa, 21
Fulton, J. P., 58
Fulton, N. D., 48, 53
Furushiro, 21
Gallegly, 62, 63
Galvez, 45
Garber, 22
Gavrielith-Gelmond, 42
Gerasimov, 45
Gerechter, 40
Gilmer, 54, 57
Glaeser, 7
Golovin, 28
Goodchild, 62
Gorlenko, 14
Grant, 46
Grossmann, 19
Grove, 11
Hack, 64
Halperin, 42
Hanson, 53
Hara, 45
Hardenburg, 55
Hart, 36
Hartisch, 17
Harwood, 53
Hassenbrauk, 35
Hatmanu, 28, 51
Hayward, 14
Hill, 11
Hille, 42
Hills, 53
Hodson, 40
Holton, 39
Horn, 58
Horsfall, 12, 18
Hutchison, 62
Iizuka, 21
Ikeda, 22
Imschenezki, 22
Inagaki, 22
Inoue, 21
Inouye, 21
Isaac, 30
Jennings, 45
Jerebzoff, 26
Jodon, 45
Johnson, C. E., 8
Johnson, T. W., 29
Johnson, W. H., 25
Johnston, A., 28
Johnston, C. O., 37
Johnston, T. H., 45
Josifović, 21
Jugenheimer, 43
Jung, 20
Kalyanasundaram, 21
Karling, 30
Kask, 51
Kaul, 36
Kaszonyi, 49
Kendrick, 39
Keyworth, 4, 64
Khokhryakov, 29
King, 48
Kingsland, 44
Klein, H. H., 58
Klein, R. M., 15
Klement, 49
Klinkowski, 63
Klos, 57
Knight, 64
Kochondi, 20
Koelle, 62
Komarova, 29
Kosljarová, 61
Kosov, 13
Kostić, 35
Kovačevsky, 31
Kramer, 34
Krasil'nikov, 27
Kröber, 63
Kühnel, 38
Kurodani, 46
Kuvshinova, 13
Kvashnina, 26
Lamb, 55
Lamey, 45
Lasheen, 55
Lauffer, 45
Lavits'ka, 50
Lazăr, 28, 51
Leonori-Ossicini, 36
Leont'eva, 45
Levine, 36
Leyten, 42
Lindberg, 43, 45
Loughnane, 6
Lutinski, 20
MacKinnon, 31
Malik, 41
Mallach, 54
Manigault, 15
Maramorosch, 31
Masago, 26
Mathur, 49
McClure, 56
McFarlin, 51
McGuire, 45
McKay, J., 6
McKay, R., 6
McMillian, 45
Meckstroth, 47
Melvin, 47
Meredith, 59
Middleton, 1
Miirić, 21
Miladinović, 35
Milbrath, 57
Miller, 17
Minogata, 21
Minz, 40, 42
Missirliu, 21
Mohamed, 37
Moore, B. J., 48
Moore, L. D., 52
Morey, 43
Murakishi, 63
Murav'ev, 39
Muromtsev, 13
Nagaich, 61
Nakaidze, 47
Narain, 46
Nelson, 30
Netzer, 19
Neururer, 41
Newsom, 45
Nicolson, 52
Nisikado, 21
Norman, 12
Novogrudskil, 27
Ogawa, 56
Okamoto, 21
Oku, 25
Overholts, 11
Pady, 34
Pag, 50
Palti, 14
Papacostea, 21
Parker, 57
Parra, 47
Pavićević, 23
Persons, 45
Phan-Chon-Ton, 25
Philipp, 44
Pieri, 1
Plempel, 20
Podhradszky, 39
Polyakov, 13
Popescu, 44
Popp, 11
Porreye, 55
Powelson, 58
Powers, 40
Prasad, 49
Presley, 48
Rao, 36
Rawla, 25
Raymer, 41
Rich, 18
Richter, 58
Robson, 15
Roeder, M., 30
Roeder, R. H., 30
Röschenthaler, 26
Rosenberg, 56
Ross, 27
Roth, 19
Sackston, 53
Sakai, 21
Saksena, 28
Salzmann, 6
Samollov, 13
Šandera, 30
Sando, 40
Sandu-Ville, 28, 51
Savage, 62
Săvulescu, 39
Sawada, 28
Schaffnit, 24
Schaller, 39
Schlehuber, 38
Schmelzer, 51
Schmidt, 16
Schmiedeknecht, 63
Schöniger, 58
Schreiter, 42
Sebesta, 38
Sen, 60
Sharma, 16
Shaw, 36
Shimizu, 21
Shmueli, 59
Siepmann, 29
Sikka, 36
Sill, 51
Sinclair, 48
Singh, 60
Šmálik, 61
Smirenskil, 13
Smith, F. F., 50
Smith, M. A., 26, 56
Smith, P. F., 46
Smith, W. L., 56
Smoot, 47
Soenen, 54
Solberg, 50
Somers, 17
Spasić, 35
Spink, 45
Stakman, 34
Stănescu, 39
Stapp, 55
Steckhan, 19
Stefandel, 18
Stoll, 15
Stonier, 16
Streshinskil, 13
Strong, 16
Suneson, 35
Sussex, 20
Szépessy, 23
Tajima, 21
Talakvadze, 47
Thind, 25
Thizy, 18
Thomas, 60
Thurston, 45
Thysell, 45
Tran tan Thong, 17
Trione, 49
Tupenevich, 27
Tuşa, 44
Umnov, 18
Vallega, 35
Van Beverwijk, 24
Vasiliu, 44
Vasudeva, 10
Venkatraman, 16
Verderevskil, 24
Viennot-Bourgin, 24
Virtanen, 43
Vogel, 37
Volcani, 14
Vukovits, 54
Wadsworth, 51
Wagnon, 56
Wahl, 42
Wahlroos, 43
Wain, 16
Way, 57
Wells, 16
Wenzl, 62
Wernham, 44
Whidden, 47
Wiles, 48
Williams, H. E., 56
Williams, P. H., 64
Williams, W. A., 53
Wilson, E. M., 59
Wilson, J. B., 63
Woodbridge, 55
Wright, 26
Yakovleva, 43
Yamamoto, 46
Yokogi, 46
Yost, 15
Young, 51
Zadina, 61
Zattler, 60
Zentmyer, 18

SUBJECT INDEX

GENERAL
- Reports from British Guiana, 11; India, 9, 10; National Vegetable Research Station, Warwick, 4; N. Rhodesia, 8; Nyasaland, 8, 9; Rothamsted exp. Sta., 1; Rubber Research Institute, Malaya, 62; Switzerland, 6; Welsh Pl. Breed. Sta., 6

Books, 11, 12, 22, 27, 28
Bacteria, **13–16**, 21, 49
Deficiency Diseases, 54
Entomogenous Fungi, 16
Fungicides, 4, **16–21**, 24, 53, 54
- Antibiotics, 21

Industrial, 21, 22
Legislation, 12, 23
Miscellaneous Publications, 28
Mycorrhiza, 24, 52
Physiology, 7, 20, 22, **24–27**, 29, 30, 38, 39, 50, 52
Root Rots, 3, 5, 6, 53
Soils and Fertilizers, 27
Systematic Mycology, **28–30**
Techniques, 13, 14, 15, 22, 30
Viruses, 2, 5, 6, 8, 10, 13, 31, 45, 51, 54, 58, 61, 62

DISEASES AND DISORDERS OF
Cacao, **31–34**
Cereals
- Wheat, 2, 9, 10, **35–41**
- Barley, **41–42**
- Oats, 42
- Rye, 43
- Maize, **43–45**
- Rice, 9, 11, 45, 46
- Sorghum, 46

Citrus, 11, **46–47**
Coffee, 47
Cotton, 48
Fibre Plants, **48–49**
Flowers and Ornamentals, 50–51
Fodder and Herbage Crops, **51–53**
Fruit
- Pome fruit, **54–56**
- Stone fruit, 54, 56
- Soft fruit, 6, 58
- Banana, **58–59**
- Tropical fruits, 60

Hops, 4, 60
Officinal Plants, 60
Palms
Potato and Sweet Potato, 3, **61–62**
Rubber, 62
Sugarcane, 62
Tobacco, **62–63**
Tomato, **63–64**
Trees
- Conifers, 3

Vegetables
- Beet and Sugar beet, 4
- Legumes, 3
- Lettuce, 5

Vine, 1